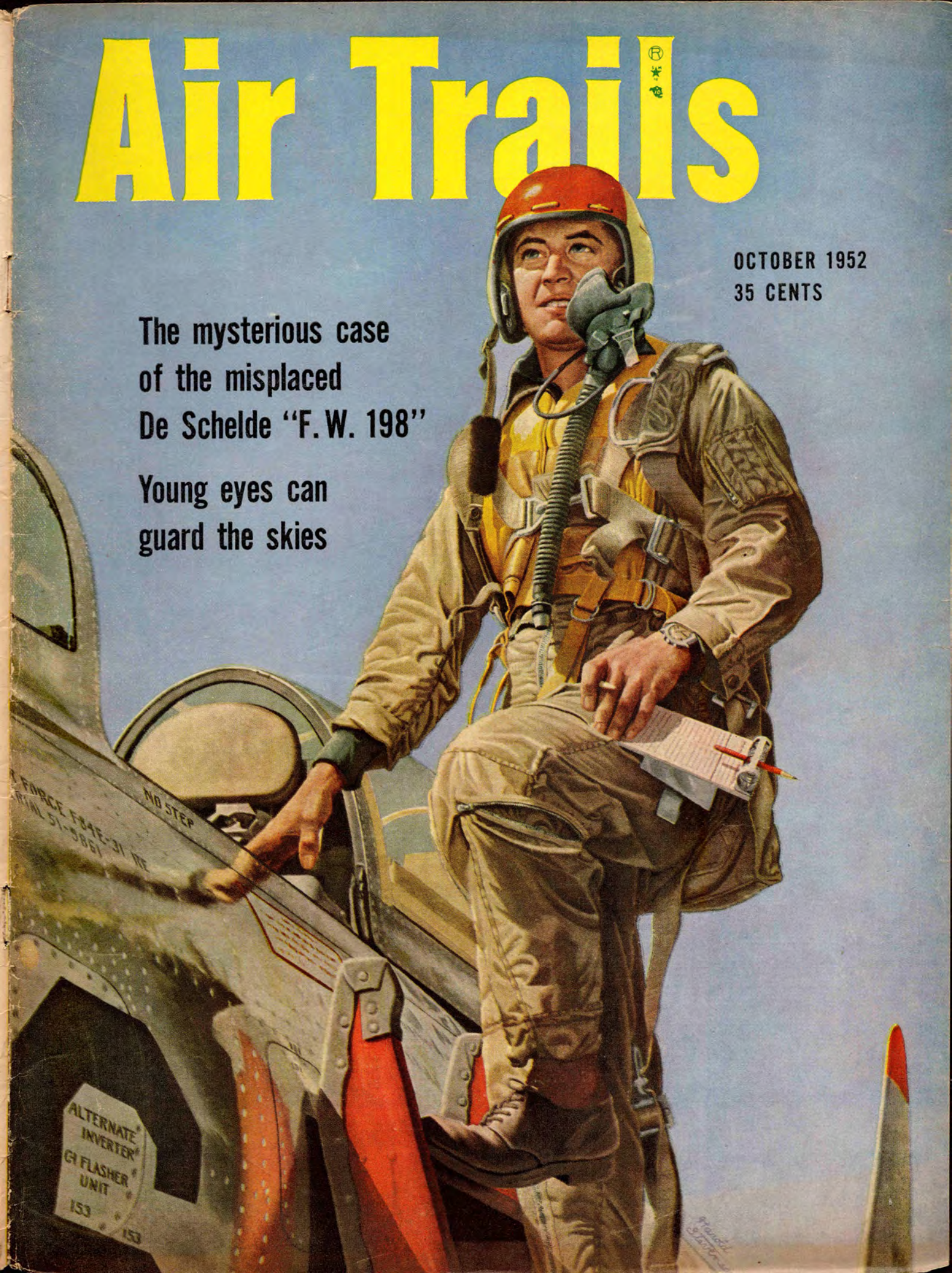
Air Trails

OCTOBER 1952
35 CENTS

The mysterious case of the misplaced De Schelde "F. W. 198"

Young eyes can guard the skies



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- ★ C-FF-Open—K&B .32—Bob Ottoman
- ★ ½A-FF-Open—K&B .049—Dick Everett
- ★ A-Speed-Sr.—K&B .19 Robert Kautzman
- ★ Team Racing—K&B .29—Bob Lutker
- ★ ½A-PAA-Jr. Sr.—K&B .049—Gene Jackman
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**11 FIRSTS IN 15 EVENTS*

***FLASH!** See page 77 for the great champions of 1952!*

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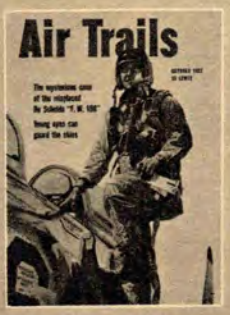
October
1952
Vol. 39, No. 1



Cover: Test pilot ready to take up Republic F-84E Thunderjet—By Harold Stevenson

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FROM THE READER

All communications to the editorial offices should be addressed to Air Trails, 304 E. 45th St., New York 17, N. Y.

Take a Deep Bow, Frank! . . . Air Trails became a must magazine for yours truly away back in 1931. I still have a couple of issues, in pretty good shape, too. There were quite a few air pulps kicking around at the time, I recall—War Birds, Wings, Aces, Air Stories—but even then, as a youngster, I was sold by the Tinsley pen illustrations, which were superior to anything then being printed. And here, in 1952, I still buy your magazine as much for his work as for anything else, because, for me, there's life in his airplane paintings.

Your other artists are good. But his stuff's something extra. I recall on those old World War I subjects the other cover artists were making 'em sleek, smooth, tinny and lifeless. But he painted 'em with the engines throwing oil—ribs and spars lumping the fabric—the old rotaries really going round! One mag, I recall, gave away a couple of his originals in a contest. I didn't even show—and I still hate the guys who won.

All this being a long-winded way to say I was glad to see his work back on AT's cover with the guided-missiles. Also enjoy the things he does in black and white. How about more work by him, if you can get it?

Also got a tremendous kick out of the article, "Open Cockpit Era," because, like the kid it described, I couldn't stay away from the airports. The nearest to my home, then, was about 18 miles. But it could've been 81 and I guess I'd've got there. It was after the period your article covered; they ended with '30. That's when I took up. It was still the old dope, canvas, multiple-strut, and wire age; the era, you might say, when everyone was trying to make a practical plane with a converted automobile engine. More articles like "Open Cockpit Era".

At the same time, your items on aviation's future are always good, too, and I recall the old Air Trails ran some articles by the American Rocket Society and Willy Ley when other "authoritative" people were sneering.

All the foregoing should give you the idea I like your magazine.

George Evans, Levittown, N. Y.

Memo for Willy Green . . . I must compliment you for a wonderful magazine, this June issue, of course. Just one thing wrong, and that is in "AT" Forum. Did Willy Green want WW I or WW II planes? If WW II the planes might be the Westland Lysander, Buecker Jungmeister and the Stinson.

Louis Crane, Brooklyn, N. Y.

• Willy Green's question read: "What World War II plane is best fitted for radio-control flying?"

Air Adventuress from Tasmania . . . Was so thrilled when I received your letter to say I could become a member of the Air Adventurers. Enclosed is my application. Thank you so very much for answering my letter by Air Mail. I shall be looking forward to hearing from your club in the near future.

Una O'Brien, Geeveston, Tasmania

CAP Cadet Pen Pal Wanted . . . I am very much interested in Civil Air Patrol and would like to know more about it. If there was some Cadet in the U.S.A. that would write to me, and we could exchange notes and interests between the CAP and the Royal Canadian Air Cadets of which I am a Sgt., I would appreciate it, especially if this boy or girl has a pilot license and Wings for which I am training now.

Sgt. F/C Roy Indseth, 734 Yale Road, West, Chilliwack, B.C., Can.

Spectators—grr! . . . Here in New York people complain a lot about noise. That's even true up at Van Cortlandt Park where we fly our models, so officers of the law often stopped our activity. So we don't usually fly our speed jobs till we're ready to call it a day.

Well, on the day of my story I had a B Hell Razor out on line ready to fly and while we were gassing up a little cherub with horns (he might've had a tail too) walked in front of us, walked past and stood square on my lines. When we told him to move he just stood there and said no. After several times of this (thank heaven I controlled myself), one of my friends picked him up and carried him to safety. We fixed the lines and were starting the engine when back came the cherub—with his father.

Papa bellowed: "Why did you manhandle my son? If he breaks anything you know I'm good for it!" (I never saw him before in my life.) I explained to him that his cherub might be seriously hurt but he interrupted, "Don't tell me, I know, 'next time you'll be sorry if anything happens.'" We forgot about him and started up the engine and with the aid of a hand launch got the job off. It buzzed around in the vicinity of 120 mph, and after the flight who comes back but the father and son duo. Here's what he said:

"I saw that! They shouldn't let you fellows fly those dangerous things! It must've been going more than 40 miles per hour! Why didn't you get my child out of the way sooner? I've a good mind to report you to the police. . . ."

It's that way all the time. You can't win.

Michael Entricken, New York, N. Y.

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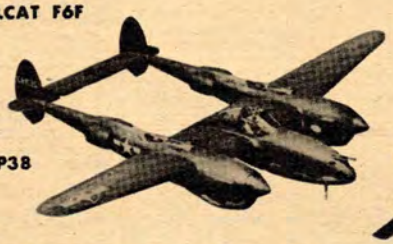

P-5 LOCKHEED LIGHTNING P38

P-12 SABRE JET F86D

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KIT P-2 DOUGLAS A26
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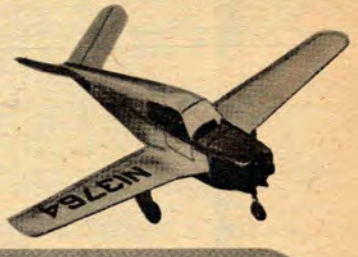

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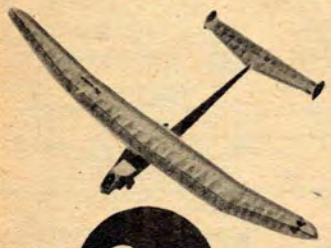

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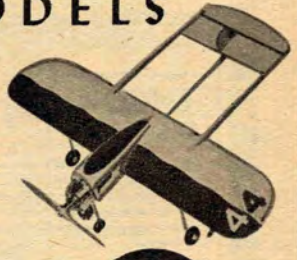

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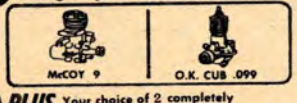

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5N9

R/C

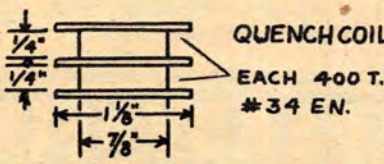
Around the modelplane radio-control circuit . . . comment and reports by a leading authority

■ Seems some of the boys are still having trouble with the license form for 27¼. Since it's our job to try to get everyone legal to the extent that all are duly licensed, here's a rundown of the F.C.C. Form 505, with all the answers you will have to put in.

First, be sure you have the *overprinted* Form 505; you can check this by looking on the back. If your form has a "Note" printed in large type at the lower right, you have the correct form. Some F.C.C. offices apparently have been accepting the original Form 505, but most will not, so play safe with the correct one.

Fill in your name and address in two different locations at the top of the sheet—left and right. The right section—which is actually Form 555—will be sent back to you as your license. On this part, put a "one" in the box under "Number of Stations" and a dash under "FCC type approval No.". Then move down to the line marked 1, and fill in your name and address again (this makes three times, all told). Fill out the other numbered lines as follows: 2—"None." 3—don't put anything here. 4—put "X" in square at far right. 5—"No." 6—put a dash in two left-hand boxes.

You have no need at all for Part II, the left-hand side of Form 505, so leave it all blank. Turn over, and under 6a, fill in squares "C" and "Yes" with an "X." Omit 10. Then return to the front of the form, *sign it at the bottom, and have it notarized.* That's all. It sounds complicated but you can do the whole thing in a minute. If you do it right, you should receive your license back from the Commission in a week or two. If you don't, you may not hear from them at all.



These answers hold true whether you build the transmitter from our plans—or from any other printed plans, make the transmitter from a kit or an original design, or buy a ready-made job.

And note that the transmitter must be crystal controlled and the power input to the tube coupled to the antenna, 5 watts or less. You can check the latter by multiplying the B battery voltage by the plate current to the tube.

People, Contests, Etc. Paul Johnson answered our request for a list of winners at the Cedar Rapids, Iowa, meet with the news that he took first with his original design ship fitted with Good Bros. receiver, and rudder and elevator control. Jack Williams, Ottumwa, was second, using MacNabb radio in Rudderbug, and two-speed motor. Third, Merrill McCoy, Des Moines, Good Bros. in Rudderbug, rudder only.

Interesting letter from Beau G. Pautz, P.O. Box 122, King William's Town, S. Africa, tells us his Robot won the R/C event for him at the S.A. Nationals this spring.

The majority of the other ships were Rudderbugs. Beau was the only one to do consecutive loops, spins and stalls. Only other R/C ship in his town is also a Robot, which he says flies like a bomb with a McCoy .19. He would like to correspond with American R/C flyers; he has been using 27 mc. for several years. Maybe he can give some of us a few tips on this band.

We learn from Howard Bonner that the L.A. Radio Controllers have adopted an identification system to distinguish between the various R/C bands, but this system calls for marking the band *on the plane.* 27¼ has circular insignia, 50 mc. has equilateral triangle, and 465 a 2-to-1 rectangle. Any other frequencies will use a large "X."

The symbol must be of a color contrasting to that on the ship, and is to be put on both the upper and lower sides of the wing; the symbols will have 27, 50 or 465 marked in them and must be at least ¾ of the chord in width. The transmitter will also have the appropriate symbol marked on it.

Howard says he is now using a relay-type pulse box with his Compound escapement. This is probably the same type we showed last month.

Pacific Radio Control Society has new slate of officers as follows: Pres., George Levick; V.P., Ralph Arista; Sec., E. L. Rockwood; Treas., R. W. MacReynolds. Contact them through Rockwood at Box 762, Walnut Creek, Calif.

(*Continued on page* 17)

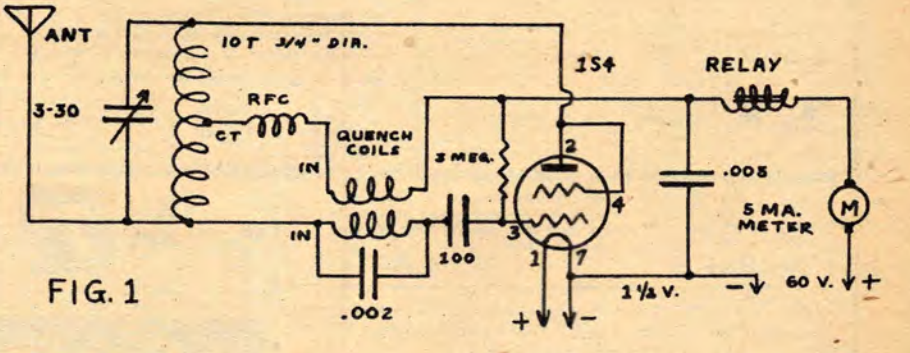
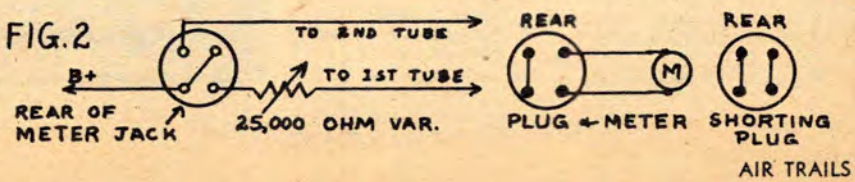


FIG. 1



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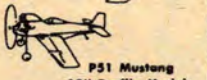

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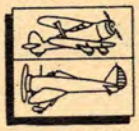

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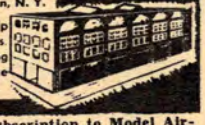

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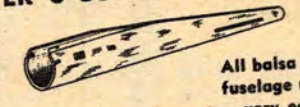

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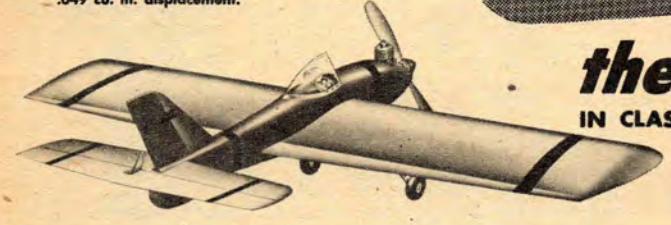

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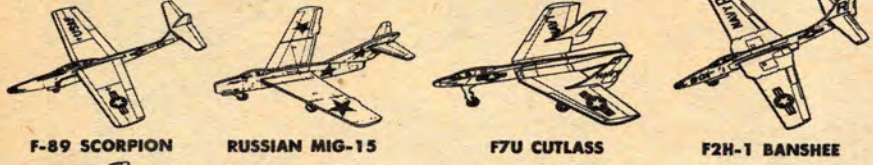

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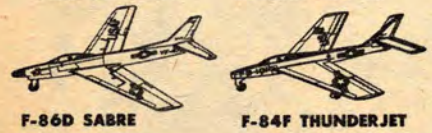

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air notes | AVIATION TODAY AND TOMORROW

WITH FLAPS in take-off position, Boeing YB-52 Stratofortress roars up from runway (above). . . . ONE HUNDRED FORTY Turbo Compound engines to power Douglas DC-7 transports have been ordered by United Airlines from Curtiss Wright corp. . . . ELECTRICAL "co-pilot" capable of guiding a plane through full aerobatic maneuvers is one of the complex electronic gadgets featured on Lockheed's latest all-weather fighter, the F-94C Starfire. The device, an automatic pilot with unlimited maneuverability, incorporating non-tumbling gyros, is also tied into the plane's radar and instrument landing system, helping it to track enemy targets automatically and to land in the dark and in foggy weather. It was developed by Westinghouse Electric.

★ ★ ★

POWER of British jets has increased tenfold in the last 11 years. First jets were rated at little over 1000 lbs. Most powerful jet at present time is the Bristol Olympus (at bottom of page) reported to develop slightly over 10,000 lbs. of thrust. U. S. jets follow closely in power growth. . . . FLIGHT TRAINING for Air Force reservists, suspended until June 1952, has been resumed on a limited scale at 22 AF Reserve Training Centers.

★ ★ ★

WE are fighting the air war with "Cadillacs;" whereas both World War II and the present Korean incident have shown that our enemies tend to employ stripped-down "hot rods," said E. H. Heineman, Chief Engineer of Douglas Aircraft Co., El Segundo Div. "The American airplanes," commented Heineman, "are generally the most complete and best built in the world. Still in many cases they have contained so much equipment that their performance and availability have been reduced to a point where their primary purpose and their tactical usefulness have suffered." *Editor's note*: This brings to mind the fate of a well-known jet fighter which started its life weighing less than 10,000 lbs. with engine of slightly over 4000 lbs. of thrust, emerged in final production, after the modifications ordered by military services, weighing 18,000 lbs. and gaining less than 25% in engine power.

★ ★ ★

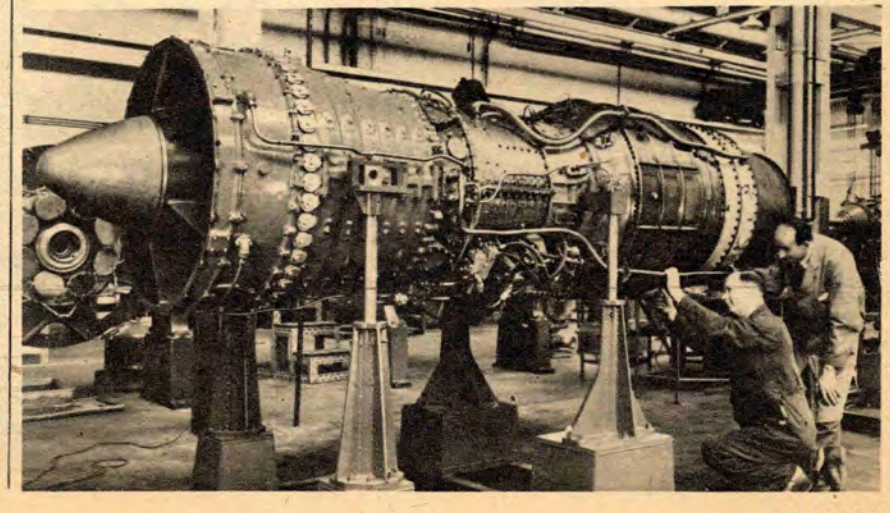
RUSSIAN GUNS and armament are a subject of two booklets, profusely illustrated and packed full of information, published by Weapons, Inc., Hudson, Ohio, and authored by Roger Marsh, armament expert. 275 illustrations, 39 pages per book. $2.00 per set.

★ ★ ★

FRENCH soaring pilot Charles Atger has established a new world duration record for single-place sailplanes, remaining aloft 56 hours 17 min. Record was confirmed by F.A.I. . . . HARMON INTERNATIONAL Air Trophy Awards winners are Mme. Jacqueline Auriol of France who set an international speed record for women of 509 mph in a jet fighter; Capt. Charles F. Blair Jr. of USA, Pan American World Airways pilot, the first pilot to fly a single-engine fighter plane (F-51) nonstop across the North Pole; and Lt. Carl J. Seiberlich, USN, who conceived, developed and tested pilot technique for use of lighter-than-air aircraft in towing underwater bodies under adverse weather conditions.

★ ★ ★

XFJ-2 FURY, Navy version of the North American F-86E Sabre, undergoing catapult tests at Patuxent NAS Test Center, Md. . . . NORTHROP working on cast magnesium wing for aircraft. Process still in experimental stage, according to reports, but shows much promise.



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G-5 Boeing Kaydet	G-10 Thunderjet F-84	G-15 Warhawk P-40F

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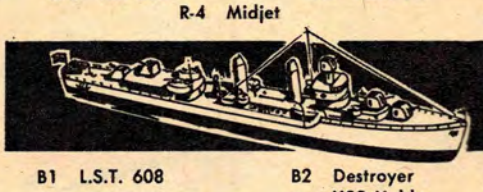

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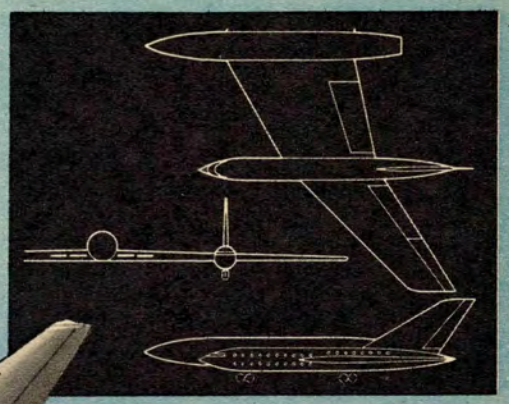
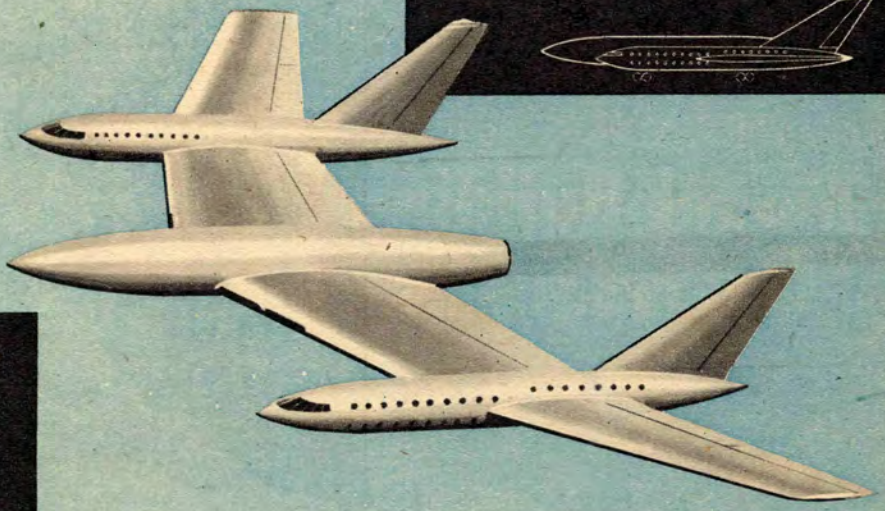
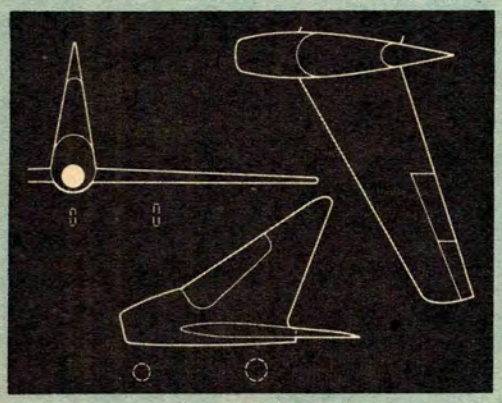
Airmen of Vision
DESIGN COMPETITION

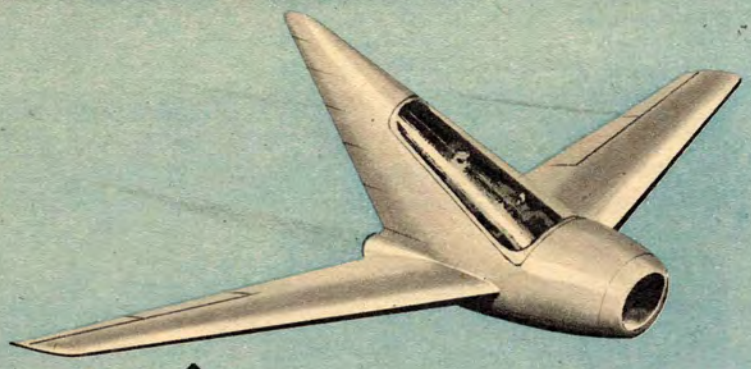


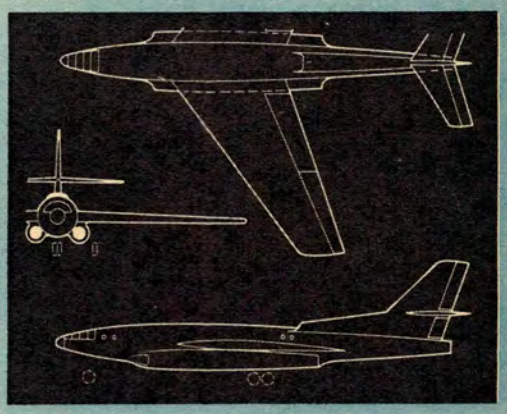
Atom-powered commercial aircraft is top entry; by Ray Ogden, Norman, Okla. Designed to minimize shielding problems, the atomic reactor-powered turbines are located in center structure. Passengers and cargo ride in outer fuselages. Estimated thrust of engines is 75,000 pounds through the turbine "chain." Center wing is swept 30 degrees, outer wings are at an angle of 45 degrees.



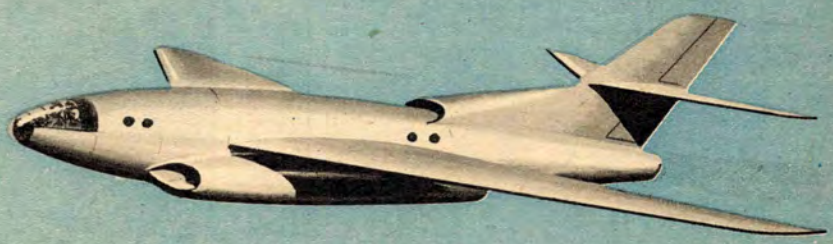


Making it a "multi-country" month, J. Temple of Toronto, Ont., comes up with this interesting 3-jet bomber. Two of the 6000 lb. thrust turbojet engines are located at mid-fuselage, third is in the tail. Span is 104 feet, length is 98 feet. Speed is 600 mph; range is 3,000 miles or better. Main wheels retract up and back at 30 deg.





The small Turbomeca jet powerplants appeal to Gunnar Zackrisson of Vanersborg, Sweden, as is evident by this tiny single-seat sportplane. Soaring qualities of this craft should be quite excellent. Pilot straddles air intake. Span is 550 cm.; length, 245 cm.; overall length, 225 cm.



Air-Trails has opened its columns to those who are interested in presenting plans for "aircraft of the future." Rules governing the competition are as follows: Three-view sketches of the proposed aircraft will be required. These should be not less than 8½ x 11 inches for the entire three views. Give sketches of the complete airplane in three-quarter front and rear positions. Photos of a model of proposed design may be included. Information of power plant(s) estimated performance, dimensions, and explanations of any unusual features are required. Data as to age, occupation or schooling of the entrant will be welcomed by the editors and judges. The design may be of any type: commercial aircraft, military planes (fighters bombers, troop transports), planes for the private flyer and single-engine sporting or racing craft. The entry each month judged the most practical or of the greatest significance will receive an award of $25. Payments of $5 will go to the runners-up. Entries will not be returned and for that reason those participating should keep copies of all material submitted. Mail entries to Airmen of Vision, c/o Air Trails, 304 E. 45th St., New York 17, N. Y. Editors regret that because of large number of entries they cannot enter into correspondence on A. of V.

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These CAP Cadets, all members of the Michigan Wing, have been awarded $115 "Flight Scholarships" by civic organizations which will provide flying lessons up to the solo stage.

Ten years ago, the Civil Air Patrol Cadet program was started quietly in hope no one would see it and stop it.

A year earlier, the founders of the senior CAP wanted a youth movement too, but had to organize adult airmen before the war grounded all. They won by only a week's margin, just before Pearl Harbor. After the coastal patrol had proved the worth, the inland Wings with less to do were restless for lack of missions. Would men who wanted to fly accept a "kid training" job instead? Old-timers doubted it. Authorities, moreover, feared to become involved in youth movements which might look militaristic or political.

So CAP sneaked its Cadet plan through the back door by labeling it as a minor change in membership rules, to admit some juniors. A one-page directive let each CAP unit form a counterpart unit of Cadets. That was all there was to it.

Yet within a few months, more than 15,000 Cadets had been organized, uniformed, and trained at a total out-of-pocket cost to the Government of about $300 or only 20c apiece!

While many another movement has failed after large expenditures and all possible fanfare, how could such a simple start make good?

CAPC was a success because, for the first time in aviation history, it brought young people—'teen age boys and girls—under the guidance of adult airmen and airwomen.

In a "one-level program," Cadets and adults attended the same classes to learn military and aviation subjects together.

From the initial page of instructions, CAPC built to some 70,000 members at its peak in the last war. Tens of thousands went into the services better prepared by their home-town experience. Young men could then join the Air Corps Enlisted Reserve at 17, train in CAPC, and become flying cadets at 18 with this head start. Letters from around the world attested how much they had been helped.

Much of this record had been forgotten until the shortage of aviation cadet applicants began to make people wonder how we got a surplus in the last go-round, not so many years ago.

Because adult instructors, as at the beginning, are the key to success, CAP should get increasing help from the pool of a quarter-million Air Force Reservists now inactive in any program. This will help build toward the 100,000 Civil Air Patrol Cadet goal, not half met at present.

But if the planners will look to the very beginning of CAP—to the intent of those who set it up in 1941—they will see a still broader plan yet unfulfilled.

The founders were well aware what other nations—Germany then as Russia today—had done to prepare youth for air service by mass movements, from aeromodeling and gliding to powered-plane flying. Our American youngsters can do a better job, American style, if they ever get the chance.

Ground Observer Corps offers biggest new opportunity for CAP Cadets. (See lead editorial in this issue.)

By itself, the GOC offers little training interest as yet; just a manual of simple instructions and pictures of planes known to most aeromodelers who could learn it all in a lesson or two.

But GOC offers a needed job—one of the few chances for young people actually to help defense without waiting to grow older. Elsewhere they can study or they can look. Here they can actually go on (Continued on page 60)

Join the Civil Air Patrol—the civilian auxiliary of the U. S. Air Force. Cadets are 14½ to 17; Senior members are 18 and over.

C. A. P. NEWS c/o Air Trails

304 East 45th St., New York 17, N. Y.

I'm interested in more information on the CAP and would like to hear from my nearest unit.

Name.....

Address.....

City (and zone).....

State.....Your Age....

Air Trails, Oct., '52

R/C

(*Continued from page 8*)

Technical Topics. Seems no matter how careful you try, someone finds a point you should have mentioned, in any description of technical apparatus. Take that little R/C test meter we detailed; a local boy built one and finds it very handy. Only thing is, sez he, the receiver doesn't seem to work quite the same after the meter is removed from the test jack as it does with it in the circuit.

He's entirely right. As we showed it, this is really a high-resistance meter, and the test jack should have a resistor of about 2,000 ohms plugged into it, when the meter is not in use. This should be done with *all* high resistance meters, in fact. Berkeley includes a suitable resistor with their low-cost 3 ma. meter for this reason.

Our meter could have been arranged to work as a low resistance type, but this would have meant digging into the case, cutting leads, and connecting a low-resistance shunt right across the terminals of the meter itself. This shunt would have to be calibrated by the use of another meter. Such operations would be out of the question for the novice, who might wreck the meter, and wouldn't have a calibrating meter, either. We'll see if it can be done in a simple manner, and report in a later issue.

The English R/C boys have been using single hard-tube receivers widely for some time, but except for the Good Bros. unit, these receivers have not been used to any extent in the U.S., especially by the home builders. Our good correspondent in Beloit, Wis., George Sweet, has been using a hard-tube receiver that he concocted, with fine results. A single 1S4 tube is used and a special "quench transformer" is needed; this may be made by the builder.

The circuit is shown in Fig. 1. George uses balsa for the quench coil form. To tune up, adjust the 3-30 mmf. condenser till you see a slight change in the test meter—the transmitter must be operating, of course. Then turn the transmitter off and increase antenna length till the plate current jumps to about 1.8 ma. or so. Now when the trans. is operated again, the current should drop to about .5 ma. The receiver has proven very sensitive and will stay in adjustment for weeks at a time, without any fiddling. Be sure to connect the quench coil with the inside ends as shown.

Having given out a good tip, George now wants an answer to a problem *he* has—where can he get good air wheels? He finds some types won't stand up on rough landing strips with heavily loaded R/C ships. Walt Good showed us a trick he has used successfully with this sort of wheel. He cuts a small slit inside the hub area of the tire, and stuffs the tire full of small chunks of sponge rubber. Makes a light and tough wheel. In the New York area, Veco wheels seem to be widely used. They are heavy but will take a beating. Anyone know of other types that are available today and will do the job?

John Worth has devised a simple system to check the plate current in two-tube receivers, such as that put out by Control Research, depicted in Fig. 2. You need a non-polarized socket (that is, one in which the plug may be inserted several different ways) and two plugs for it. One plug connects to the meter; insert this one as shown on the drawing, to read current in Tube 1. Turn it upside down for Tube 2 current. When the meter is not in use, the shorting plug must be in the socket.

Commercial News. A new E.D. "Compact" escapement is available from Polk's, 314 Fifth Ave., New York City. It weighs .92 oz. and operates on 300 ma. at 4-½ V. Price is $5.95. This new escapement does not supersede the Mark III unit that Polk's have carried for some time, and which is a little lighter and has a current-saving device. Both are of the two arm self-neutralizing design. Polk's can supply a two-section collapsible antenna, 4' 4-½" long when extended and 2' 4" when closed. Comes with all mounting hardware, for

(*Continued on page 58*)

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TRAIN IN MIAMI -- AIR CAPITAL OF THE WORLD

Young eyes can guard the skies

Who could better serve in the Ground Observer Corps than the young men and women air enthusiasts and the millions of American model airplane builders and flyers? So let's utilize youth!

■ In the round-the-clock watch for enemy aircraft, there are no keener eyes and ears for the daylight or early evening shifts than America's young people.

We mean those millions who make and fly model aircraft and know the real ones at a glance. We mean especially those who voluntarily study with the Civil Air Patrol Cadets, Air Explorer Scouts, Wing Scouts, and local model clubs.

Thus far, the young people have been almost totally ignored by the Ground Observer Corps.

This show belongs to the Air Force, now wondering why the lads it failed to notice can't see its Aviation Cadet recruiting posters. Both for the present manning of its watch and as a means of telling tomorrow's recruits they are needed and wanted, what better opportunity than to welcome them into the GOC!

The GOC operates under the Air Defense Command through 49 filter stations and 19,400 Ground Observation Posts in 36 States—all but the South-Central area. The electronic eyes in the radar screen can't cover every approach, high and low. Human watchers as of old must be on guard . . . constantly.

In July, the system in 27 States was put on a 24-hour watch. No new crisis; just a step that could no longer wait. To delay would make it the harder to convince lagging volunteers. Civil Defense authorities were supposed to round up the observers. But CD has been so weak in many areas that it has seemed the Air Force would have to do the whole job.

One would think that the Air Force would turn to the organizations which it fosters, in this crisis.

In at least two regions—Tennessee and California—the Civil Air Patrol Cadets and Air Explorer Scouts have done an outstanding job as Ground Observers. But as this is written, there is no nation-wide plan to bring more eager young people into this work.

As for the millions of aeromodelers, they could be making scale models of aircraft of all nations, showing them in volunteer recruiting displays, and awakening public interest. We tried to tell the authorities this two years ago and were brusquely informed that the GOC did not intend to teach plane recognition and wanted no models.

If GOC fails at any point, it is easy for officials to blame "public apathy." But would the public be apathetic if thousands of young men and women came home with observer wings and poured their fresh enthusiasm into the movement?

The GOC says in its manual that its service is open to all loyal citizens who can see, hear, speak, and use good judgment. Who fits these requirements better than the young, self-disciplined air enthusiasts in every community?

We say give them a chance to serve in this duty and watch them grow up with it.

Colonel John C. Meyer is one of America's top living aces, credited with 39½ enemy aircraft destroyed.

Perhaps even more important, he is one of today's leading "maker of aces." As the original combat commander of the 4th Fighter Group (the first F-86 outfit to tangle with the MiG-15 in Korea) he was instrumental in working out the tactics which have dropped MiG-15s from Korean skies in the ratio of seven for every one F-86 destroyed.

Colonel Meyer personally accounted for two MiG-15s while in Korea. In World War II, he flew 200 combat missions in Europe and Iceland and shot down 37½ enemy planes. At present, he is deputy commander of the 4703rd Defense Wing at Larson AFB, Moses Lake, Washington. . . . This article is from the official USAF "Air Training."

What Makes a Jet Ace?

By COL. JOHN C. MEYER, Deputy Commander, 4703rd Defense Wing, USAF

■ Most people think of fighter tactics as a vast, complicated, difficult field in which clever and tricky rules of thumb carry a gifted few to glory. Nothing could be further from the truth.

The first rule in fighter tactics is "keep 'em simple." Even these simple rules must be flexible, however, to meet the rapid changes in the battle situation. But the rule is "simple changes of simple fundamentals." These fundamentals are the heart and guts of the fighter ace and the fighter unit of which he is a part.

There are only three. We call them "The Triple-A Threat" or "The One-Two-Three" of air fighting. They are: 1. Air Discipline. 2. Aerial Gunnery. 3. Aggressiveness.

Air Discipline is just a combination of all the principles of military flying which make it possible for a pilot to play as a member of the Air Force team. Air Discipline is a measure of all his pilot abilities—technique and judgment in all kinds of weather, in formation flying, cruise control and the many other matters which are the everyday lessons of future aces now in Air Training Command.

This Air Discipline is just another name for teamwork, and it's the team that wins. It's the line and the blocking back that make the touchdown hero. The line and blocking back of air fighting are rolled up into one name—wingman. The team of element leader and wingman is the heart of the successful air unit, and the cardinal sin is for them to break up. Jim Jabara very nearly had the tag "posthumous" before his title of jet ace when, on one occasion, his wingman lost him in an air battle over MiG Alley.

Aerial gunnery is self-explanatory. It's obvious that when the aggressive team succeeds in getting into position for the kill, the pilot must hit the target. Good training in high-speed camera gunnery with immediate film assessment is the key to training for this fundamental requirement of an air fighter.

Aggressiveness, of course, is the will to fight. A successful fighter pilot must want the job. If you don't have a fighting heart, the air fight is not for you.

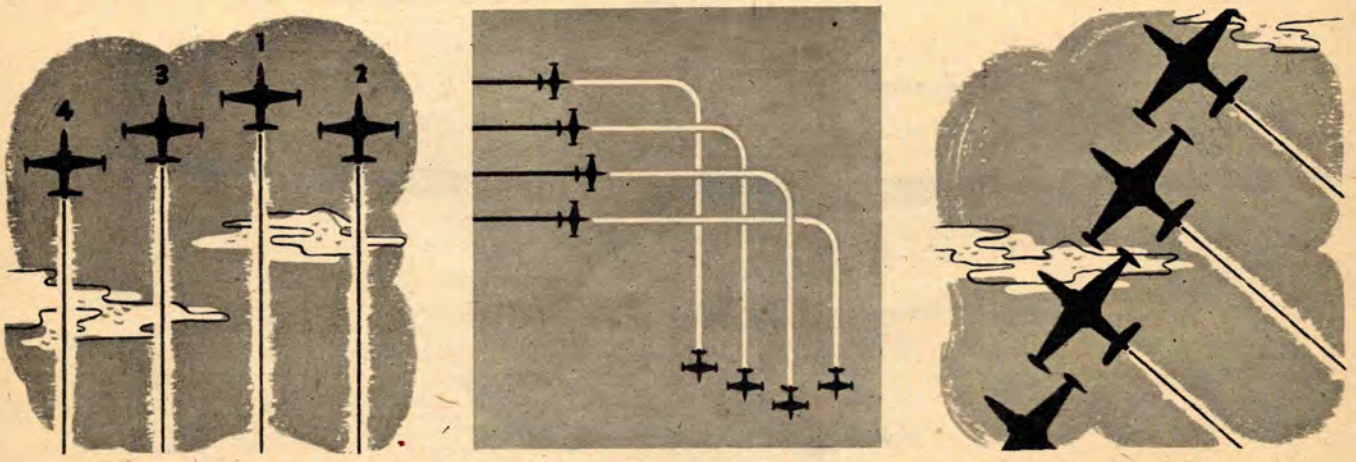
Only the simple, the fundamental, the thoroughly practiced and the completely disciplined reactions will work smoothly in the hot breath of battle.

It is easy to compare air combat tactics to brilliant plays in a football game. Fans credit the winning coach with genius and the victorious quarterback with astute field generalship. But the same plays, executed by the losers, appear ridiculous.

Simply, good tactics are really good fundamentals. In football they are blocking, tackling, aggressiveness and teamwork. A fighting heart wins the games. The battles and the fancy plays are merely refinements.

The fighter plane is first of all an offensive weapon, and all tactics must be based upon aggressive thinking and action.

While the concept of fighter aviation at the highest levels is defensive—defense of the target (city, factory, transportation system, etc.), defense of the area (battlefield area) or defense of the bomber—the use of his aircraft, from the pilot's point of view, is offensive. "Attack, attack, attack," must be his watchword. He must press the attack to successful conclusion once committed, chase the enemy in the sky, over his home airdrome, into his pilot's (*Continued on page* 64)

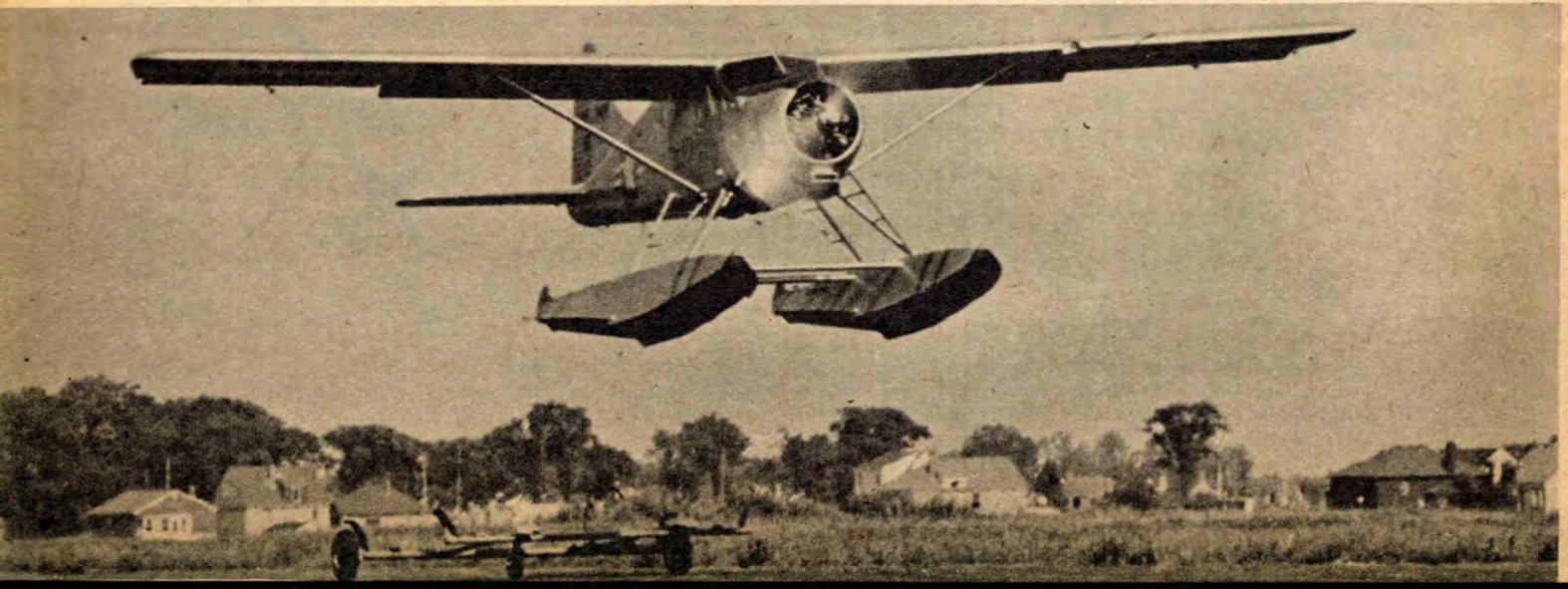


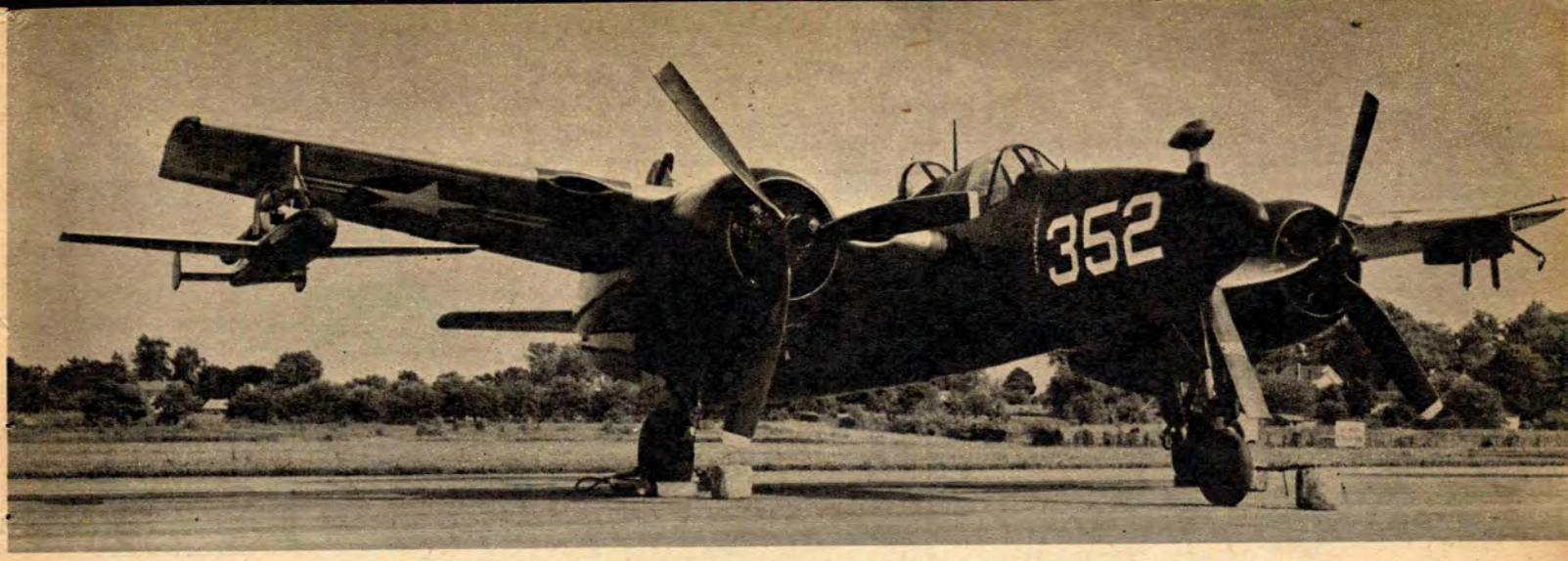
Combat flight consists of two "elements." Numbers (1) and (2) make up one element, numbers (3) and (4) the other. This is fingertip formation. Flight turn is diagramed in center above. Combat flights fly much farther apart allowing more room for maneuvers. Echelon formation (right) is used just prior to peel-off for landing. Plane on far right first breaks away to his right. Others follow at regular intervals, placing the entire flight in "trail."

American airpower's latest answer to air invasion: Lockheed F-94C Starfire, all-weather jet interceptor. Radar and "brain-like" instruments enable it to spot enemy, lock onto target, track, aim and open fire, with its 24 2.75 inch rockets housed in ring of firing tubes around nose. (See inset.) Main duty of pilot is to guide it on take-off, approach, landing. Inset photo by INP.

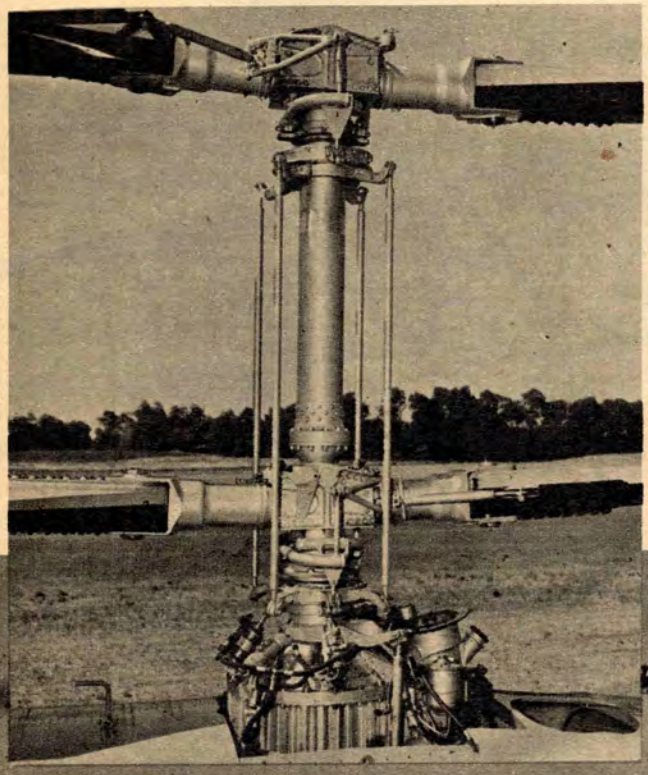
The World A-Wing

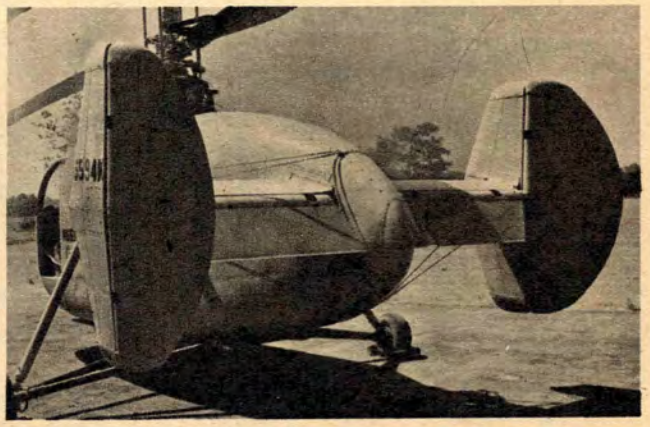
de Havilland Beaver, USAF L-20A, floatplane leaving ground via special dolly. With 14 mph headwind, became airborne in 375 ft.





Grumman F7F-2D Tigercat with a KD2G-2 Katydid jet target drone slung under starboard wing. The Tigercat is a special test plane used at the Johnsville, Pa., NAS for hauling aloft jet drones, guided missiles, to obtain data. Note second cockpit for observer-radio operator.





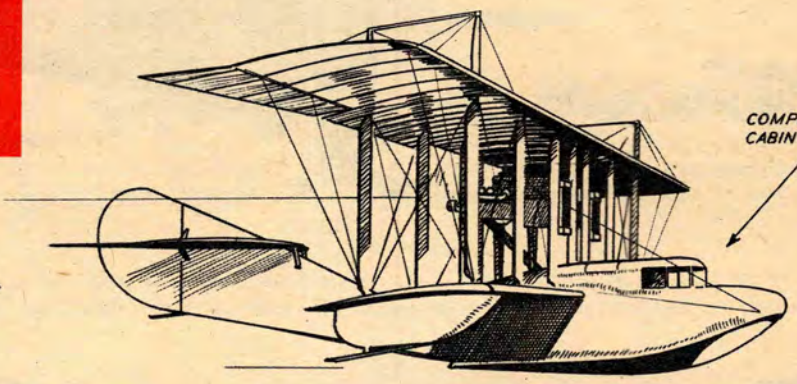
Gyrodyne Model 2C, seven-place co-axial helicopter being tested for the Navy. Co-axial blade arrangement, left, eliminates torque requires no tail rotor. Normal rudder for turns, above. 450 hp P&W.

AIR PROGRESS

By DOUGLAS ROLFE

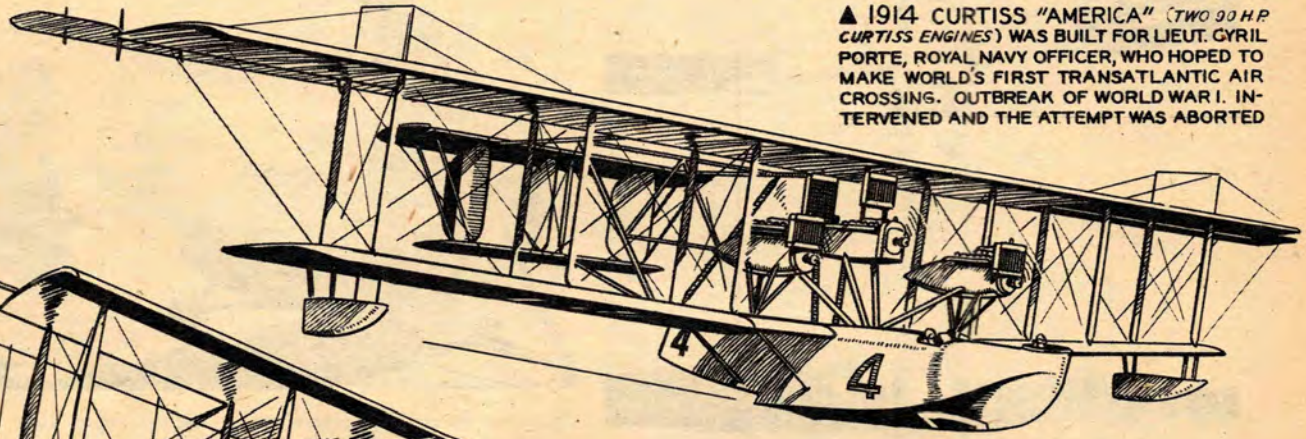
Conquest of the Atlantic

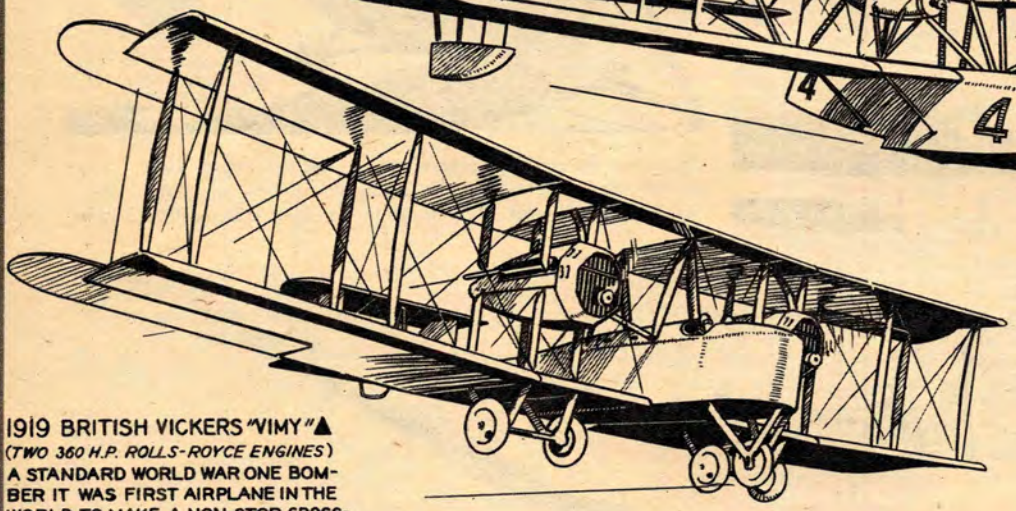
NOTE: CURTISS BOATS WERE BEST IN THE WORLD AT THIS TIME



COMPLETELY ENCLOSED CABIN IS NOTEWORTHY

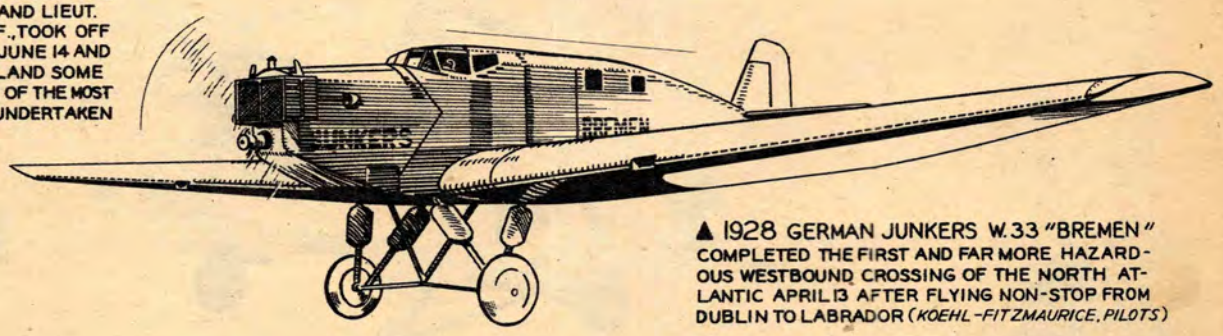
▲ 1914 CURTISS "AMERICA" (*TWO 90 H.P. CURTISS ENGINES*) WAS BUILT FOR LIEUT. GYRIL PORTE, ROYAL NAVY OFFICER, WHO HOPED TO MAKE WORLD'S FIRST TRANSATLANTIC AIR CROSSING. OUTBREAK OF WORLD WAR I. INTERVENED AND THE ATTEMPT WAS ABORTED





1919 BRITISH VICKERS "VIMY" ▲ (*TWO 360 H.P. ROLLS-ROYCE ENGINES*) A STANDARD WORLD WAR ONE BOMBER IT WAS FIRST AIRPLANE IN THE WORLD TO MAKE A NON-STOP CROSSING OF THE NORTH ATLANTIC. THE PILOTS, CAPT. ALCOCK AND LIEUT. WHITTEN-BROWN R.A.F., TOOK OFF FROM NEWFOUNDLAND JUNE 14 AND CRASH-LANDED IN IRELAND SOME 16 HOURS LATER - ONE OF THE MOST DARING FLIGHTS EVER UNDERTAKEN

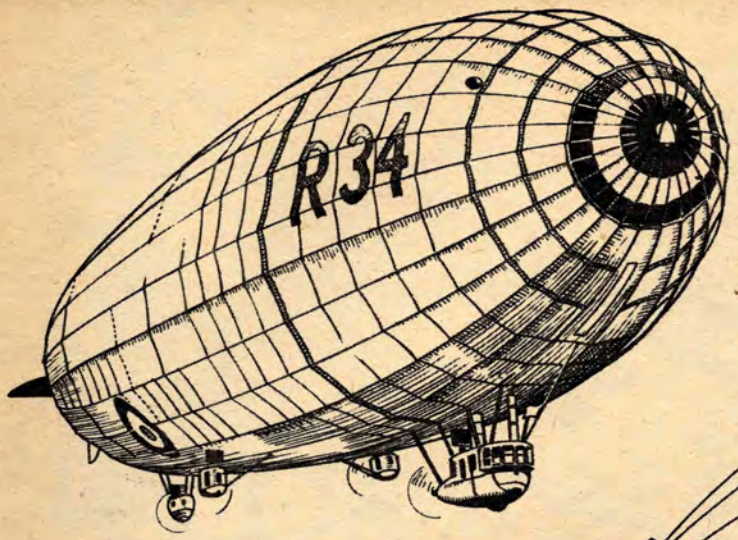
▲ 1919 U.S. NAVY CURTISS N.C.4 (*FOUR 400 H.P. LIBERTY ENGINES*) WAS FIRST AIRPLANE IN THE WORLD TO COMPLETE A TRANSATLANTIC TRIP. WITH TWO OTHER SIMILAR CRAFT IT TOOK OFF FROM NEWFOUNDLAND ON MAY 8 AND ARRIVED ALONE, VIA THE AZORES, AT PLYMOUTH, ENG. MAY 31. A SISTER SHIP, THE N.C.1, WAS FIRST AIRPLANE TO CARRY 50 PASSENGERS



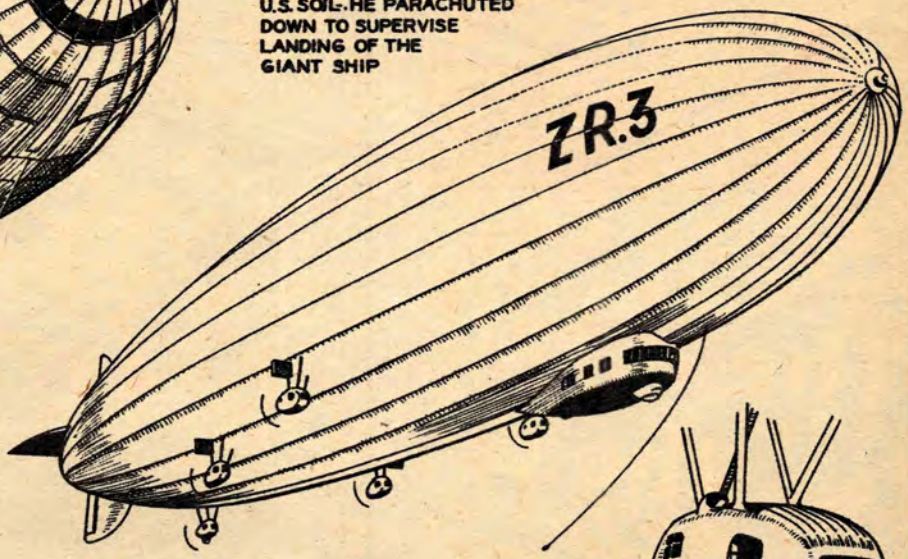
▲ 1928 GERMAN JUNKERS W.33 "BREMEN" COMPLETED THE FIRST AND FAR MORE HAZARDOUS WESTBOUND CROSSING OF THE NORTH ATLANTIC APRIL 13 AFTER FLYING NON-STOP FROM DUBLIN TO LABRADOR (*KOEHL-FITZMAURICE, PILOTS*)

In telling the pictorial history of the conquest of the Atlantic we have omitted the Lindbergh saga since this has already been thoroughly documented and our concern here is with the other machines and the other men who blazed the trail over both North and South Atlantic Oceans and who are also to be regarded as real pioneers.

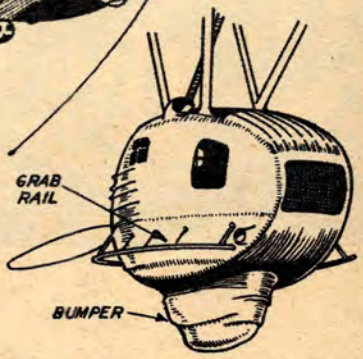
Alcock and Brown, the almost forgotten men, made their historic nonstop flight over the North Atlantic some eight years before Lindbergh's first nonstop New York-Paris flight. Actually it was a matter of pure luck that Alcock and Brown were first of the nonstop flyers. On May 18th, 1919, another pair of Englishmen—Harry Hawker and Grieve—took off



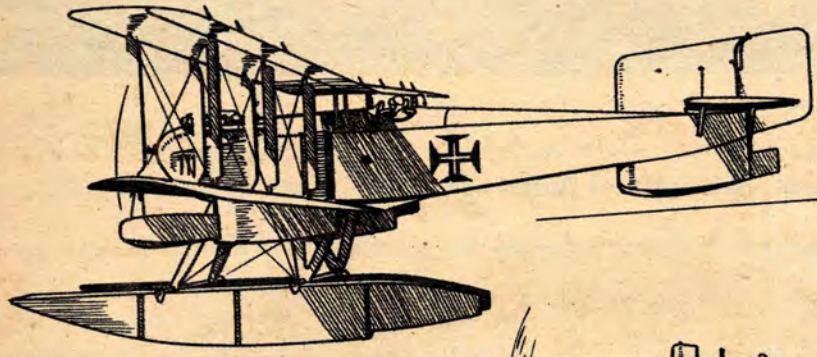
◀ 1919 BRITISH RIGID DIRIGIBLE R-34 WAS FIRST LIGHTER-THAN-AIR CRAFT TO MAKE THE NORTH ATLANTIC CROSSING AND FIRST AIRCRAFT OF ANY TYPE TO COMPLETE THE DOUBLE CROSSING. IT LEFT EAST FORTUNE, SCOTLAND, JULY 2 AND ARRIVED AT HAZELHURST, L.I., 108 HOURS LATER. RETURN FLIGHT REQUIRED 75 HOURS.—THE COMMANDER—MAJ. SCOTT WAS FIRST TRANSATLANTIC AIR TRAVELER TO SET FOOT ON U.S. SOIL. HE PARACHUTED DOWN TO SUPERVISE LANDING OF THE GIANT SHIP



1924 GERMAN ZEPPELIN ZR.3 WAS ▶ SECOND AIRSHIP TO CROSS THE N. ATLANTIC AND BETTERED THE R-34'S WESTBOUND TIME BY SOME 27 HOURS. ON ARRIVAL AT LAKEHURST IT WAS TURNED OVER TO THE U.S. NAVY BY ITS FAMED COMMANDER, DR. HUGO ECKNER, AND WAS LATER COMMISSIONED AS THE U.S. AIRSHIP "LOS ANGELES"

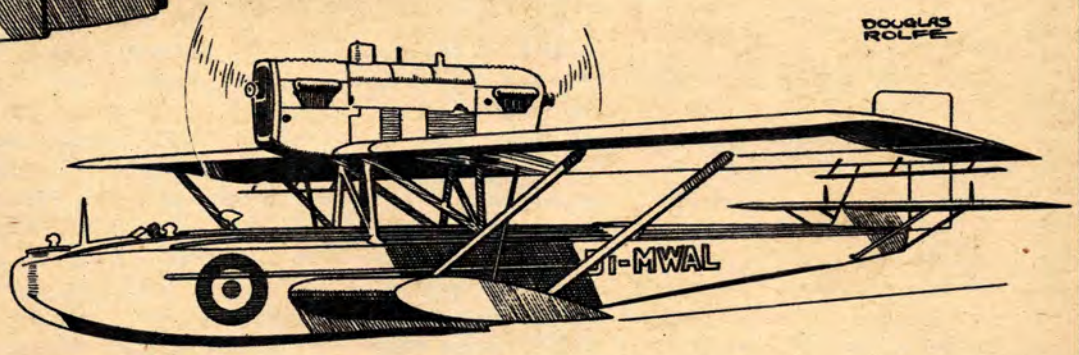


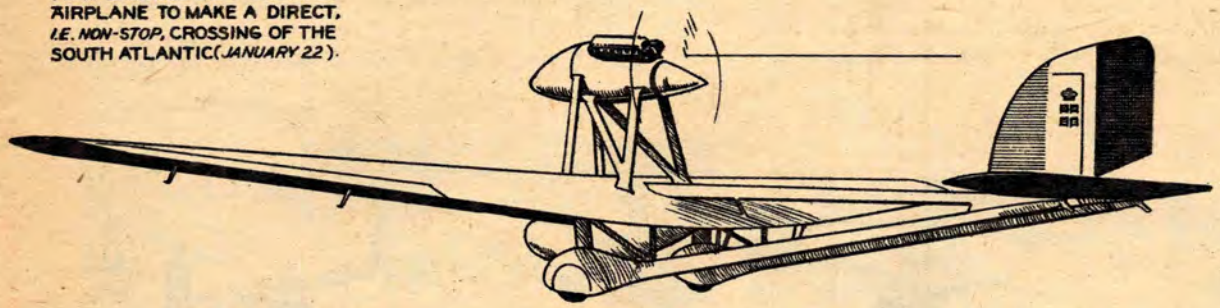
DETAIL OF ONE OF THE FIVE ENGINE GONDOLAS OF THE Z R3. EACH HOUSED A 400 H.P. MAYBACH ENGINE (VEE-12)



1922 BRITISH FAIREY III ▲ (*360 H.P. ROLLS-ROYCE ENGINE*) WAS FIRST AIRPLANE TO COMPLETE A SOUTH ATLANTIC CROSSING. (MARCH 22 - APRIL 19, SACADURA CABRAL AND ADMIRAL COUTINHO OF THE PORTUGESE NAVY, PILOTS)

1926 GERMAN DORNIER WAL (*TWO 450 H.P. NAPIER LION ENG.*) ▶ WITH MAJOR RAMON FRANCO AT THE CONTROLS THIS TANDEM-TWIN-ENGINED BOAT WAS FIRST AIRPLANE TO MAKE A DIRECT, *I.E. NON-STOP*, CROSSING OF THE SOUTH ATLANTIC (*JANUARY 22*).

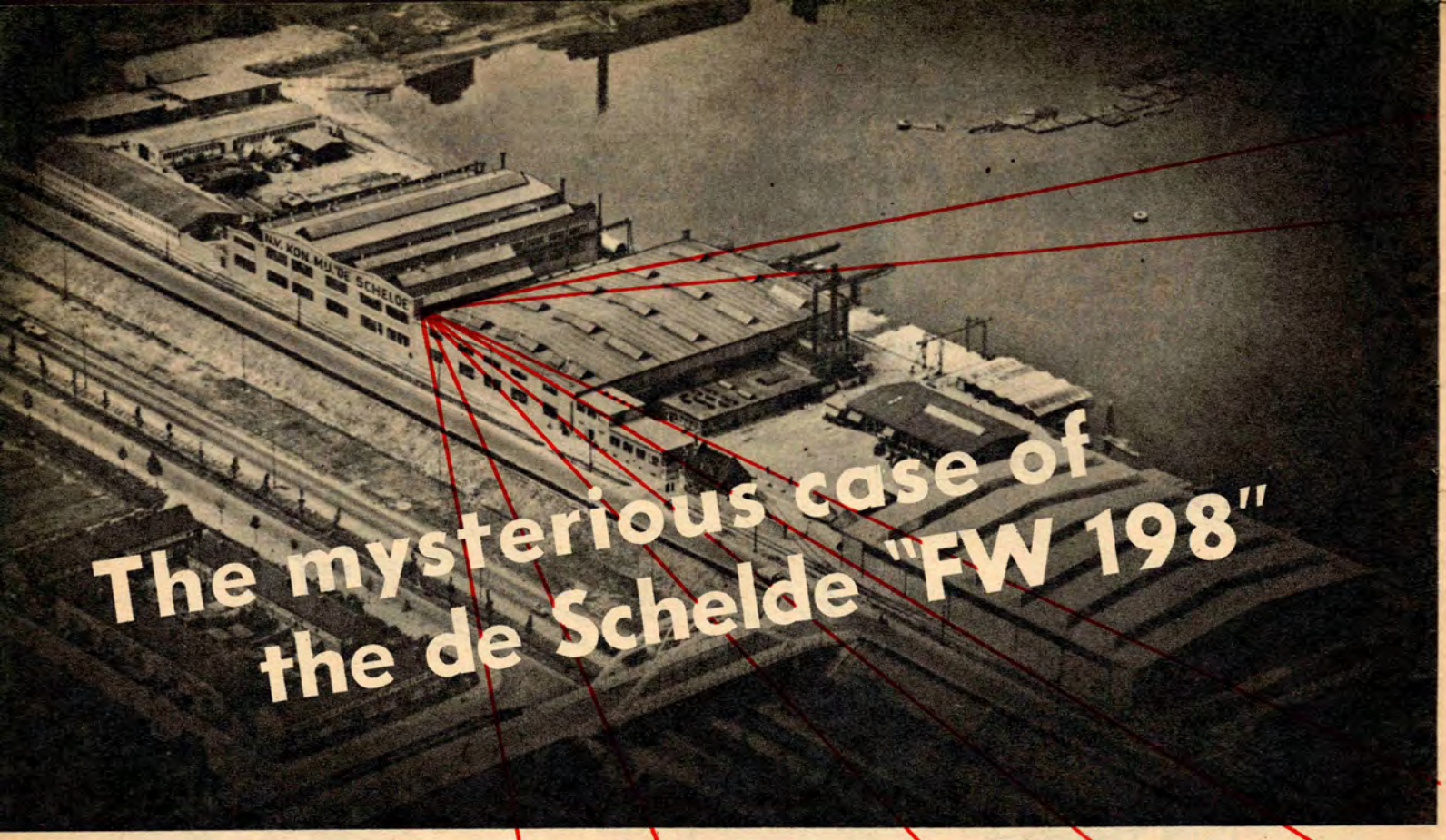




◀ 1928 ITALIAN SAVOIA-MARCHETTI S-64 (*550 H.P. FIAT ENGINE*) PILOTED BY ARTURO FERRARIN THE S.64 TOOK OFF FROM ROME JULY 5TH. AND FLEW 4460 MILES TO BRAZIL—FIRST NON-STOP FLIGHT BETWEEN EUROPE AND THE SO. AMERICAN MAINLAND

from Newfoundland in a Sopwith biplane and actually covered 1,100 miles before a broken oil line forced them down into the sea from which they were providentially rescued by a passing freighter.

Aircraft shown on these pages illustrate the pioneer flights which took place in the conquest of both North and South Atlantic Oceans. Many other notable flights were accomplished between 1927 and 1932, but those detailed here were the essentially pioneer flights. Although the "America" never made the trip she provided much valuable data for subsequent transatlantic aircraft. In final form the "America" mounted a third engine atop the wing at center front.



The mysterious case of the de Schelde "FW 198"

Swedish aircraft manufacturer enlists aid of Dutch concern to prove to U.S. fans that the much-publicized "FW 198" existed—but not as a German design!

■ As far as Air Trails was concerned it all began in the spring of 1951. It can be traced to an innocent-appearing query from reader Kenneth Hands, Ellicott City, Md., who asked among other things, "I would like to know if the Focke-Wulf FW 200's and the 198's were used much, and if they were successful."

Part of our reply was a one-line sentence: "There was no such airplane as the FW 198." We doubt in the history of aviation that nine words resulted in more of an uproar. From all across America, from across the seas, from practically every country came angry messages.

No magazine had ever pulled such a boner, they said . . . according to spotters handbook so-and-so . . . . . why, thousands had even built solid scale models and here were the kit plans to prove that the 198 existed. . . . and so far, far into many, many nights.

You see, we'd based our assertion on USAF technical publications and captured German air force reports, none of which ever mentioned a Focke-Wulf 198. But look at *Jane's All The World's Aircraft for 1940,* we were told (and in no uncertain terms!). And sure enough, big as life and twice as impressive, there was the FW 198!

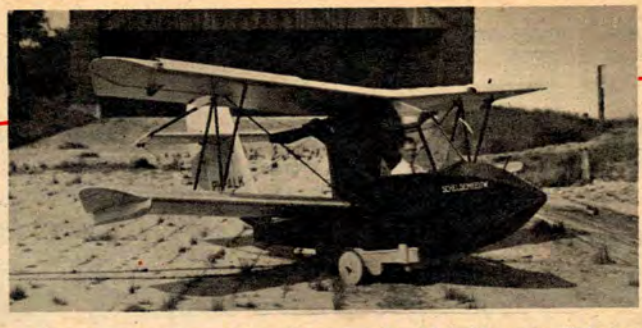
But it was from correspondent William Green of London, England, that the real story came. Mr. Green wrote in part:

"I will tell you why this airplane did not appear in

S.12 was first original design of de Schelde Company. All-wood 4-seater had a 130 hp D.H. Gypsy Major; 134 mph; 620 mi. range.

S.20, 4-seat pusher-type personal and trainer aircraft flown in '40. Hirth HM 506A in-line 160 hp engine; 150 mph; 560 mi. range.

The "Scheldemusch" was a very successful single-seat biplane with tricycle gear. With 40 hp Praga B 2-cyl. engine speed was 78 mph.



A flying boat version of the "Musch," the "Scheldemeeuw." Later redesigned with an all-metal fuselage. Used by Dutch flying clubs.

the German *Flugzeug Typenbuch*—it was *not a German airplane.*

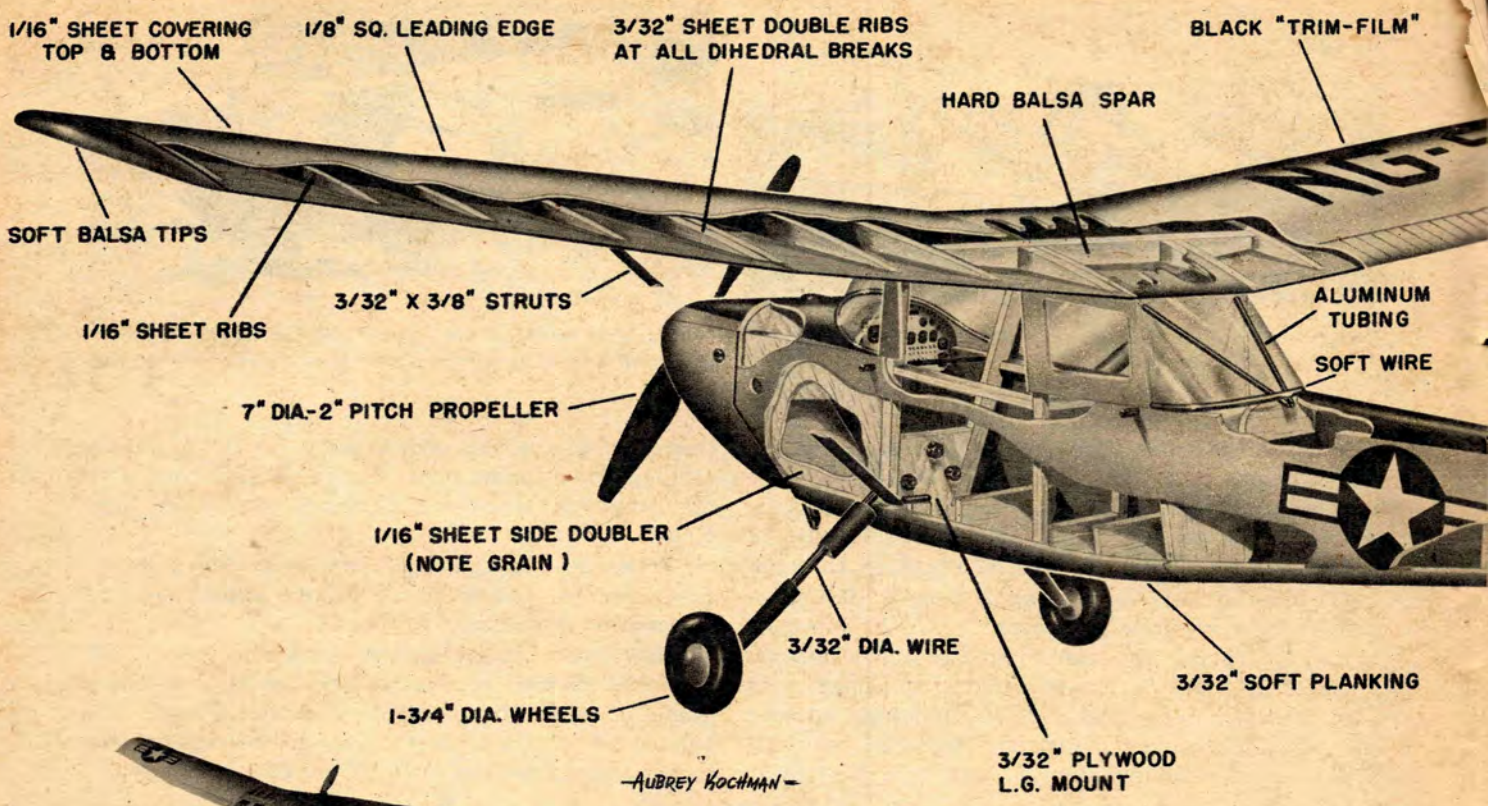
"The machine was actually the de Schelde S.21, built in 1938 by the *Koninklijke Maatschappij 'de Schelde'* at that concern's plant at Flushing, Holland.

"Powered by a 1,175 hp Daimler Benz DB 601 driving a pusher airscrew and carrying two 20-mm cannon, this airplane was later completed and, I believe, demonstrated at the National Socialist Congress of Nuremburg in September 1938 (as stated by another of your correspondents, Anthony Schmidt) where it evoked considerable interest from the *Luftwaffe.* However, production orders were not forthcoming, although de Schelde were still tinkering about with the prototype when the Germans took over their plant.

"Thus, although no machine *carried the designation FW 198,* the machine usually known by this designation *did exist.*

"How did it become known as the Focke-Wulf FW 198? Well, before the war Holland's most prolific airplane manufacturer was the Fokker concern. The company's products were known throughout the world and, to the less well- (*Continued on page* 67)

And, here, dear friends, is the S.21 which was erroneously tagged the "FW 198." Features were a movable forward-firing machine gun, a 23-mm cannon firing rearwards through the pusher prop hub and a bomber-type cockpit. Check with factory at Dordrecht (near Rotterdam)!



Cessna L-19 "Bird Dog"

Has the Half-A flying scale "bug" gotcha? Then what better project could you try than this beauty?

By
AUBREY "RED" KOCHMAN

■ During the fall of 1949, the Air Force and the Army worked out a set of specifications for a new and improved liaison airplane. Several leading aircraft manufacturers entered into competition to design an airplane that would fulfill these specifications; the Cessna 305 was the winner.

Deliveries of this model in quantity were made in the fall of 1950 with the Army designating it their L-19. On duty in combat areas six to ten hours every day, this flexible observer has proved itself tops for "flushing" enemy troops, hence the nickname "Bird Dog."

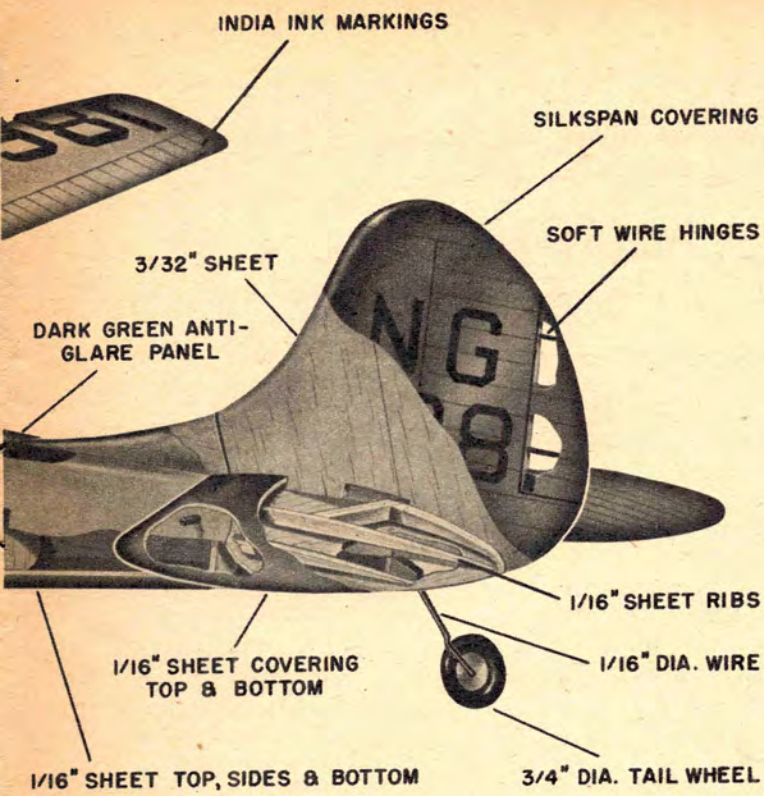
The *Bird Dog* is an all-metal airplane with a 36 ft. wingspan and is powered by a 213 hp engine. It has a maximum speed of 146 mph and an observation speed of only 46 mph.

The model presented herewith is scaled one inch to the foot directly from factory-supplied drawings. However, in order to improve lateral stability and all-around performance, the dihedral angle and stabilizer area have been slightly increased. Control line scale fans should follow the scale stab and dihedral—as per dotted lines on plan.

In keeping with the all-metal construction of the *Bird Dog,* our model is constructed primarily of 1/16" sheet balsa. Light weight being a prime requisite of any successful Half-A flying scale model has more or less dictated that the finished model be patterned after the National Guard's polished aluminum finish with dark green anti-glare panels. The olive drab paint job as used by the Army and the Marines would require considerably more applications of colored dope, and therefore add weight, to achieve the same finishing results as can be had with two or three coats of aluminum dope.

Start construction of the fuselage by cutting the sides and formers to shape. Notice that former F-3 is built up and includes the plywood landing gear mount which should be drilled for the "J" bolts before assembly is begun. Mark the former locations on the inside of both side pieces and cement the side doubler sheets to the sides between F-1 and F-3.

Assemble the sides by first cementing F-3 and F-4 in place. Add formers F-2, F-5, F-6 and F-7, working



rearward to F-7. As seen on the plan top view, the fuselage has a straight taper rearward from F-3. It is important that this straight taper be maintained or real difficulty will be encountered when adding the top and bottom sheeting.

Cement the window outline pieces in place and add the ⅛" sq. pieces as shown in the front view at F-10 and also on the side view. Cut the top cabin pieces from hard ⅛" sheet and cement them in place. These pieces also form the wing rest. Cut F-1 from 3/32" plywood and drill the engine mounting holes as shown if a "Wasp" is to be used. If a "Spitfire" timer is mounted, cut a hole in the plywood as shown. This hole will allow the fuel line tubes to extend through the face of the firewall.

Cement F-1 in place and also the 3/32" sheet from the bottom of F-1 down and rearward to F-8. This piece seals off the fuselage from engine exhaust and forms the mounting piece for the dummy exhaust stacks. Cement the timer in place and where necessary use scrap balsa wedges to hold it in its proper position. When located properly, the actuating arm and spring clip can be operated without difficulty. Cut a small hole in the opposite side of the fuselage so that a small screwdriver may be inserted through it to make necessary adjustments to the timer.

Solder the engine mounting nuts to a brass plate and cement the plate to the rear of F-1. Add the remaining formers and the tail wheel unit. Bend the landing gear to shape and bolt it in place.

Covering the top and bottom with 1/16" sheet is quite simple if the following procedure is followed. Cut the sheet to proper length. Cut an ⅛" wide strip of paper (writing paper is fine) and use it to measure the exact circumference of the first and last formers to be covered. Mark these lengths off on the corresponding ends of the sheet. Use a metal straight edge when cutting to shape. Apply a thin coat of cement to the underside of the sheet, spreading it evenly with your finger. Wet the outside of the sheet with water, being careful not to get any water on the still-wet

cement side. As the cement dries it will curl the sheet. Check the amount of curl by trial-fitting the sheet to the fuselage. When the sheet closely assumes the proper shape, cement it in place.

The bottom of the fuselage between F-4 and F-8 cannot be sheet-covered because of the double bends involved. Therefore it must be planked. Use 3/32" thick strips. Start planking at the center and work toward the sides. When completely planked, sand to conform to the sheeting thickness.

Build up the cowl and carve to shape shown. Use Weldwood glue to hold the hardwood blocks to the firewall. The cowl is thus held in place with two small wood screws that pass through the cowl and into these hardwood blocks.

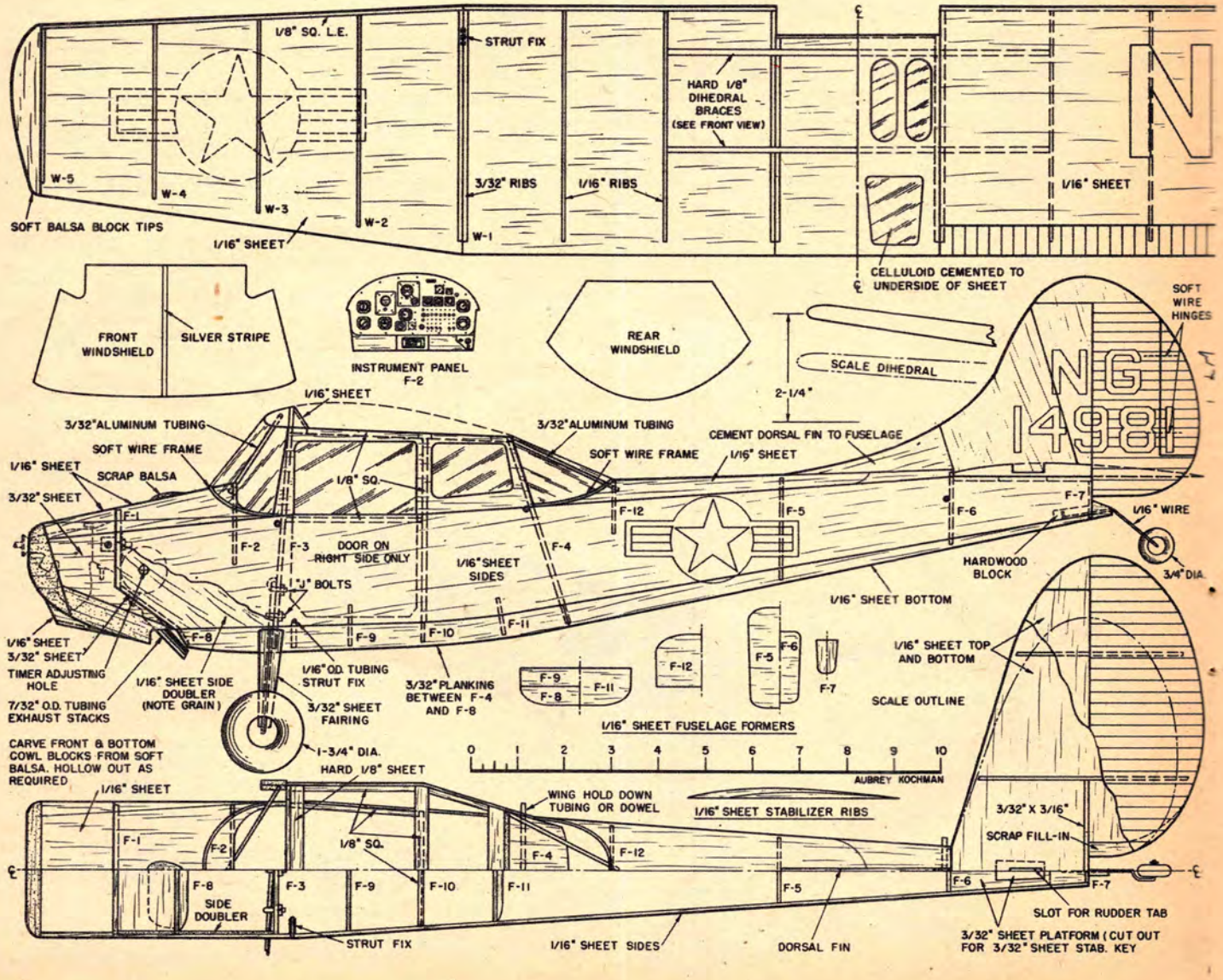
Six-inch balsa sheets should be used for the wing to simplify construction and insure a smooth airfoil. Notice that although the top surface of the wing employs a straight dihedral, the lower surface has a slight polyhedral. This is accomplished in the following manner.

Cut the 1/16" sheet to outline shape, excluding the tips. Then cut this sheet into five panels corresponding to the dihedral breaks. Cement the 1/8" sq. leading edge in place on the sheets. Cut all ribs to shape from stock indicated and cement them in place. Cut the two dihedral braces from hard 1/8" sheet and cement them across the center section sheet.

Working on one half of the wing at a time, taper the 3/32" double ribs for proper dihedral angle and cement the panels together. The top covering is cut to outline shape but slightly oversize, about 1/4", to allow for bending. Cut this sheet into three sections, the center section and two main panels. Use a slow-drying cement and plenty of pins to hold the top sheeting in place. Sight along the trailing edge and eliminate any warps. This is important, for once the cement has dried it is practically impossible to correct even the slightest warp.

When the cement is completely dry add the balsa tips and sand the entire wing to airfoil shape. The center section sheet is now cut out as indicated for the windows and the celluloid cemented to the underside of the sheet. Paint the inside of the center section aluminum before cementing the top sheet in place.

The construction of the stabilizer



follows that of the wing. Cut the top and bottom sheets to outline shape. Cement the ribs in place on the bottom sheet. Add the short 3/32"x3/16" spar and cement the top sheet in place. Fill in with scrap balsa as shown. Cut the rudder to shape from 3/32" sheet, preferably quarter grained, and cement to the stabilizer. Note that the rudder is notched into the stabilizer. The tail surfaces are removable but the dorsal fin is cemented to the fuselage.

Go over the entire model with fine sandpaper and remove any irregularities. Cover the whole model with lightweight Silkspan and apply at least three coats of clear dope before color doping. After color doping install the instrument panel. The panel was cut from a piece of silver Trim-Film without removing the paper backing. The instruments are all black-faced. India ink works well for drawing in the numerous dials, knobs, switches etc. The lower portion of F-2 should be painted black before cementing the instrument panel to it.

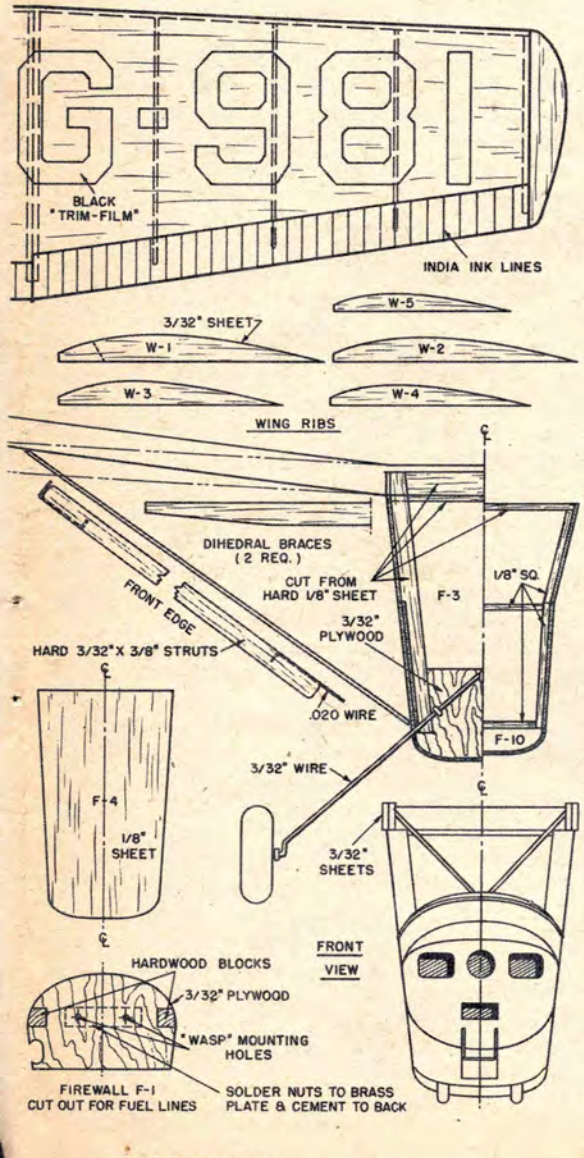
Cement the celluloid side windows in place from the inside of the fuselage. Bend the soft wire windshield frames to shape and carefully cement them in place. Add the celluloid windshields. A thin strip of silver Trim-Film goes on center of front windshield.

Slight modifications must be made to the Wasp fuel tank in order for it to hold fuel while in an inverted position. For obvious reasons the small breather hole must be plugged. The pointed end of a safety pin carefully driven into the hole will do the job very nicely. A new breather hold is drilled into opposite side of tank.

Cut the dummy exhaust stacks from 7/32" aluminum tubing. Pinch one end together and drill a small hole through this flattened end. The stacks are held in place with small wood screws and cement. By wiring the glowplug to them, the stacks become the outside starting battery connections.

Before attempting hand glides or power flights make certain that the model balances at one third the wing chord. Your *Bird Dog* has a natural tendency to fly in left-hand circles under power. So it's wise to use a low-pitch propeller for initial flights.

We've all seen some mighty nice-looking Half-A free flight scale jobs since the event became popular, but this one is a real honey. The National Guard color scheme of silver was chosen to keep weight low. Control line fans can load 'er up, though, with olive drab if desired.



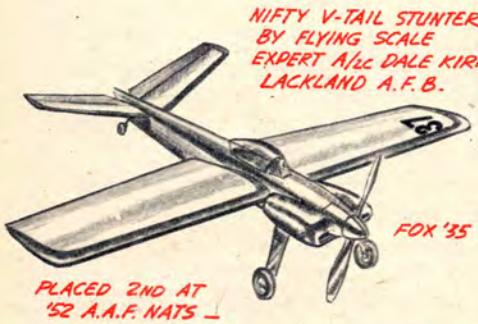
BILL OF MATERIALS

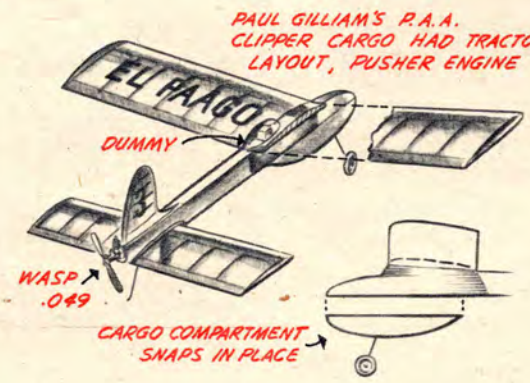
4 sheets of 1/16"x6"x36". 2 pcs. 1/8" sq. x36". 1 sheet 1/8"x2"x36" hard. 1 sheet 3/32"x3"x36". 3/32" plywood. 3/32" dia. wire. 1/16" dia. wire. 3/32" dia. alum. tubing. 7/32" dia. aluminum tubing, 1 pr. 1¾" dia. wheels. 1¾" tailwheel, 1 sheet lightweight Silkspan, cement, clear dope, aluminum dope, dark green dope, silver and black Trim-Film, 4 Air Force insignia. Flight timer.

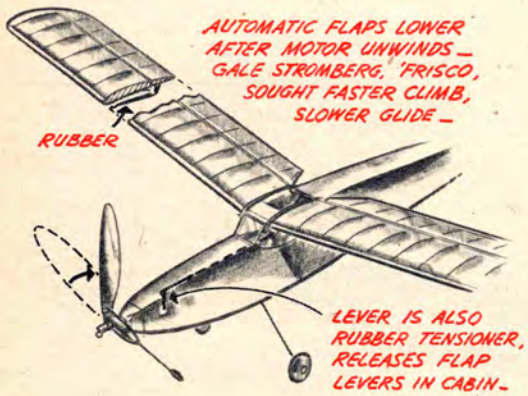
Note: Additional materials required such as cowl blocks and wingtip blocks are not listed by size as these can be found in your scrap box.

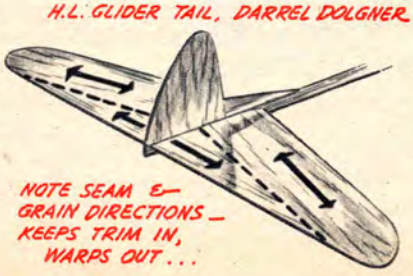
Here is the "real" L-19 in its official Army dress: olive drab with silver numerals and lettering, official US air insignia on side of fuselage. "A-289" appears on underside of left (port) wing and topside of right wing. L-19 is rapidly replacing L-5 in the field.

West Coast




PAUL GILLIAM'S P.A.A. CLIPPER CARGO HAD TRACTOR LAYOUT, PUSHER ENGINE
EL PAGO
DUMMY
WASP .049
CARGO COMPARTMENT SNAPS IN PLACE


AUTOMATIC FLAPS LOWER AFTER MOTOR UNWINDS— GALE STROMBERG, 'FRISCO, SOUGHT FASTER CLIMB, SLOWER GLIDE—
RUBBER
LEVER IS ALSO RUBBER TENSIONER, RELEASES FLAP LEVERS IN CABIN.



NAVAL AIR STATION, LOS ALAMITOS, CALIF.— Initial Registration at the 21st National Championship Model Airplane Meet, the "Olympics" of model aviation, indicated that it was "California-against-the-nation" as nearly 500 Californians signed up for the big seven-day meet. Besides those from most States in the Union, early contenders represented Canada, Hawaii and Mexico, and an Air Force contingent registered "from overseas."

The National championships were sponsored by the Exchange Club of Long Beach, Calif., with the cooperation of the United States Navy. "Cooperation" is too mild a word to describe the magnificent work by all Navy "hands" whose untiring efforts made the 21st competition one of the best run of all National meets. Equally outstanding was the work of Exchangites who undertook a gigantic task in presenting the first West Coast Nationals in the history of American aeromodeling.

Truly a meet for modelers run by modelers, the Championships were under the direction of the Southern California Model Association, a majority of whose leader members officiated at the 28 events sanctioned by the Academy of Model Aeronautics.

One example of how the Navy folks went "all out" to give the modelers the best they knew how was in the construction of an R.O.W. take-off site. Since there were no lakes available on the base, personnel working under the direction of Capt. E. J. Drew, commanding officer, bulldozed out a pond 200 by 300 feet and exactly 4 inches deep!

Top air-model leaders in the California area made up the contest committee. AT's own Dick Everett was selected as events supervisor after the untimely and sudden death of John M. Bollinger, whose passing just prior to the meet saddened the model fraternity across the nation. Every contestant cheered the news when 18-year-old John Bollinger, Jr., won the towline contest in the senior class.

Paul Gilliam, noted free flight designer, once again residing in California after several years in Texas as a member of the Texas Eagles club, provided the first funny story of the meet when he "flipped his lid" on the way to the meet by car. Seems that the lid of Paul's model box being carried atop his car blew off, scattering his many fine models across several counties. Paul's first inkling of the awful truth came when a car caught up with him with its driver waving a Civvy Boy fuselage out the window!

All categories were run off at the Los Alamitos NAS except for the indoor events which took place in the vast dirigible hangar at

Nationals

the Santa Ana Air Base. Unsettled air conditions in that vast hangar gave the microfilm crowd some difficult going, but despite this an indoor hand-launched glider record of 1 minute, 13.9 seconds was set by Joe Foster, Jr., of the Oakland Cloud Dusters. Joe flew a 57 sq. in. glider weighing .75 oz. with balancing clay. Bill (Wuz That a Wasp?) Atwood, noted indoor designer, garnered top honors in microfilm stick with a flight of 27 minutes, 52 seconds. Former national champ Frank Cummings walked off with high place in cabin flying with a time of 21 minutes, 47.2 seconds. His young son Frank (3rd) took junior stick competition with 22:51.8.

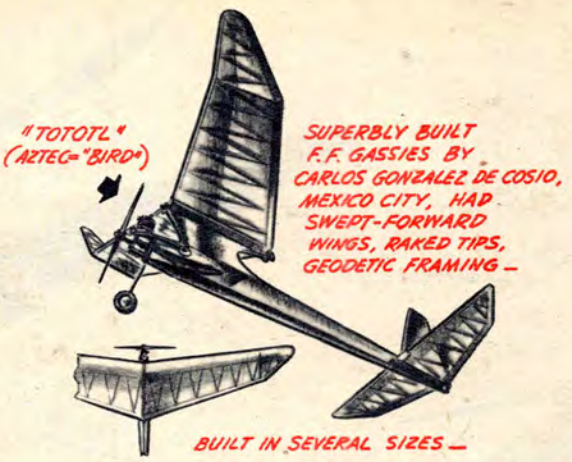
A top speed of 131.77 miles per hour was racked up by George C. Mueller from Marana Air Base, just a few miles slower than his new national mark set at the Air Force World Wide Meet at Amarillo in early July. Free flight activities opened up with Alvin J. Smith of Santa Barbara, Calif., recording 16:52.6 with a Class B entry. The California flying conditions of fog in the morning and wind in the afternoon were puzzling to most out-of-state entrants, but all agreed that the "fair deal for all" attitude on the part of the directing personnel was a wonderful indication of why California has led in model aeronautical developments for so many years.

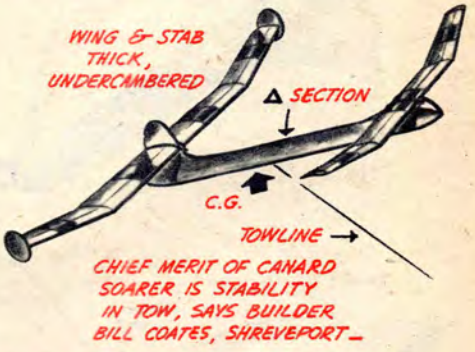
This was the fifth consecutive year that the U. S. modelplane championships have been held on a Navy air base. In 1948 and 1949 the competition was conducted at the Olathe, Kansas, NAS; in 1950 and 1951 Dallas, Texas, NAS played host to the "Nats." Placed in service in September 1942, the Los Alamitos base was originally engaged in elimination flight training for prospective Naval Aviation Cadets, and in those days the air was full of N2S "yellow perils" while the barracks housed 1,200 fledgling pilots. In the midst of World War II, operating fleet squadrons were moved in.

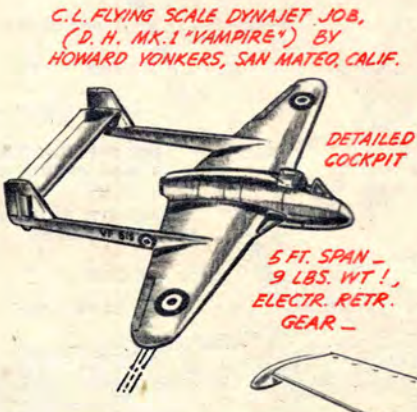
Today this station ranks first in size of the 28 Naval Air Reserve Stations in the U.S. About 3,100 pilots and ground personnel from the Los Angeles area are engaged in a continual training program and remain in readiness for any emergency.

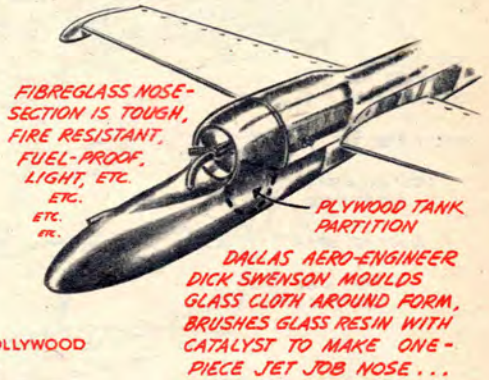
When all the sound and fury were o'er, Joe Foster Jr., 25, of Oakland, Calif., was declared the National Champ for 1952-'53, the Oakland Cloud Dusters the Championship Club.

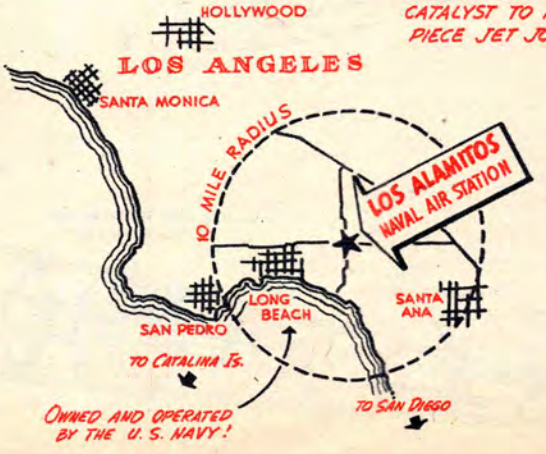
This year's Nationals—whether you call it the "West Coast Nats," the "California Nats" or merely tag it as the first such affair west of the Rockies—will go down as one of the really outstanding aeromodeling competitions of all time.


"TOTOTL" (AZTEC="BIRD")
SUPERBLY BUILT F.F. GASSIES BY CARLOS GONZALEZ DE COSIO, MEXICO CITY, HAD SWEPT-FORWARD WINGS, RAKED TIPS, GEODETIC FRAMING—
BUILT IN SEVERAL SIZES—


WING & STAB THICK, UNDERCAMBERED
SECTION
C.G.
TOWLINE
CHIEF MERIT OF CANARD SOARER IS STABILITY IN TOW, SAYS BUILDER BILL COATES, SHREVEPORT—


C.L. FLYING SCALE DYNAJET JOB, (D. H. MK.1 "VAMPIRE") BY HOWARD YONKERS, SAN MATEO, CALIF.
DETAILED COCKPIT
5 FT. SPAN—
9 LBS. WT!,
ELECTR. RETR. GEAR—


FIBREGLASS NOSE-SECTION IS TOUGH, FIRE RESISTANT, FUEL-PROOF, LIGHT, ETC. ETC. ETC. ETC.
PLYWOOD TANK PARTITION
DALLAS AERO-ENGINEER DICK SWENSON MOULDS GLASS CLOTH AROUND FORM, BRUSHES GLASS RESIN WITH CATALYST TO MAKE ONE-PIECE JET JOB NOSE...



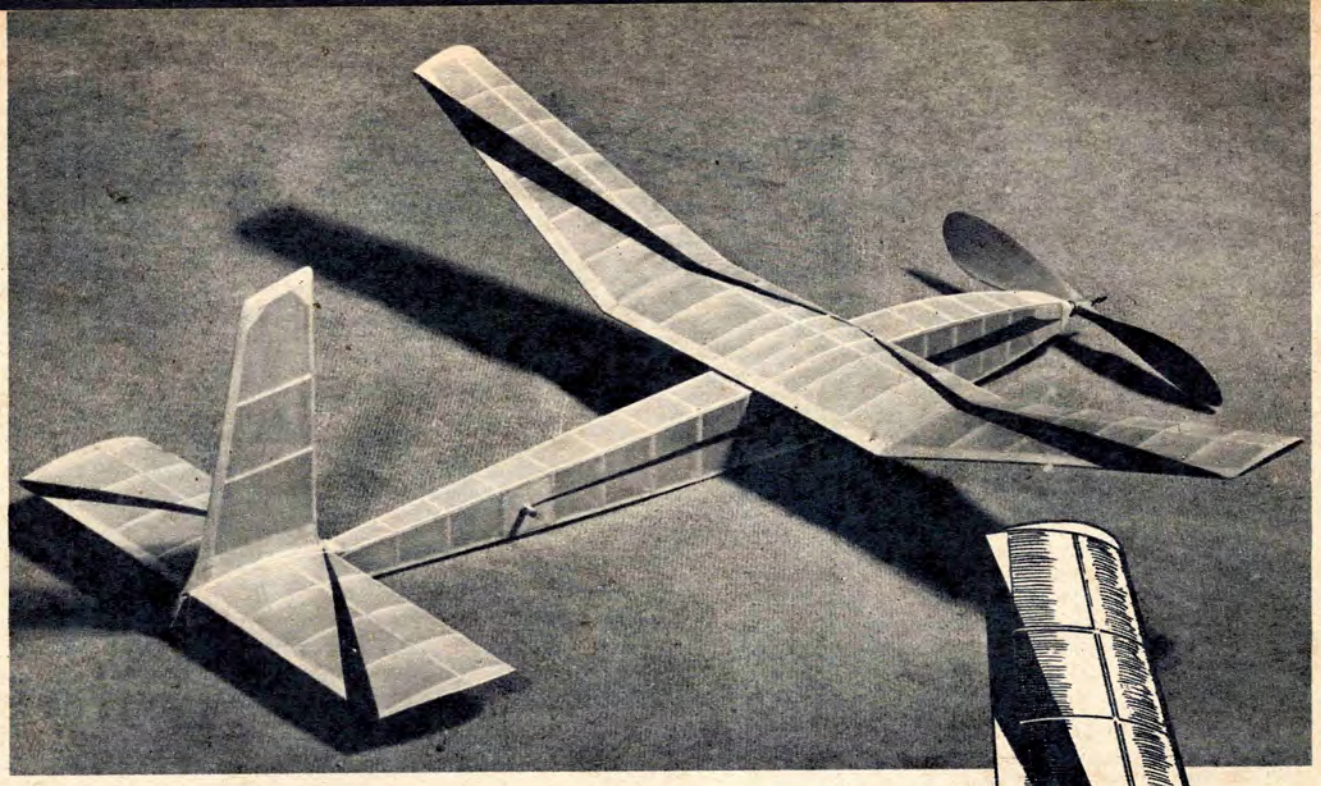
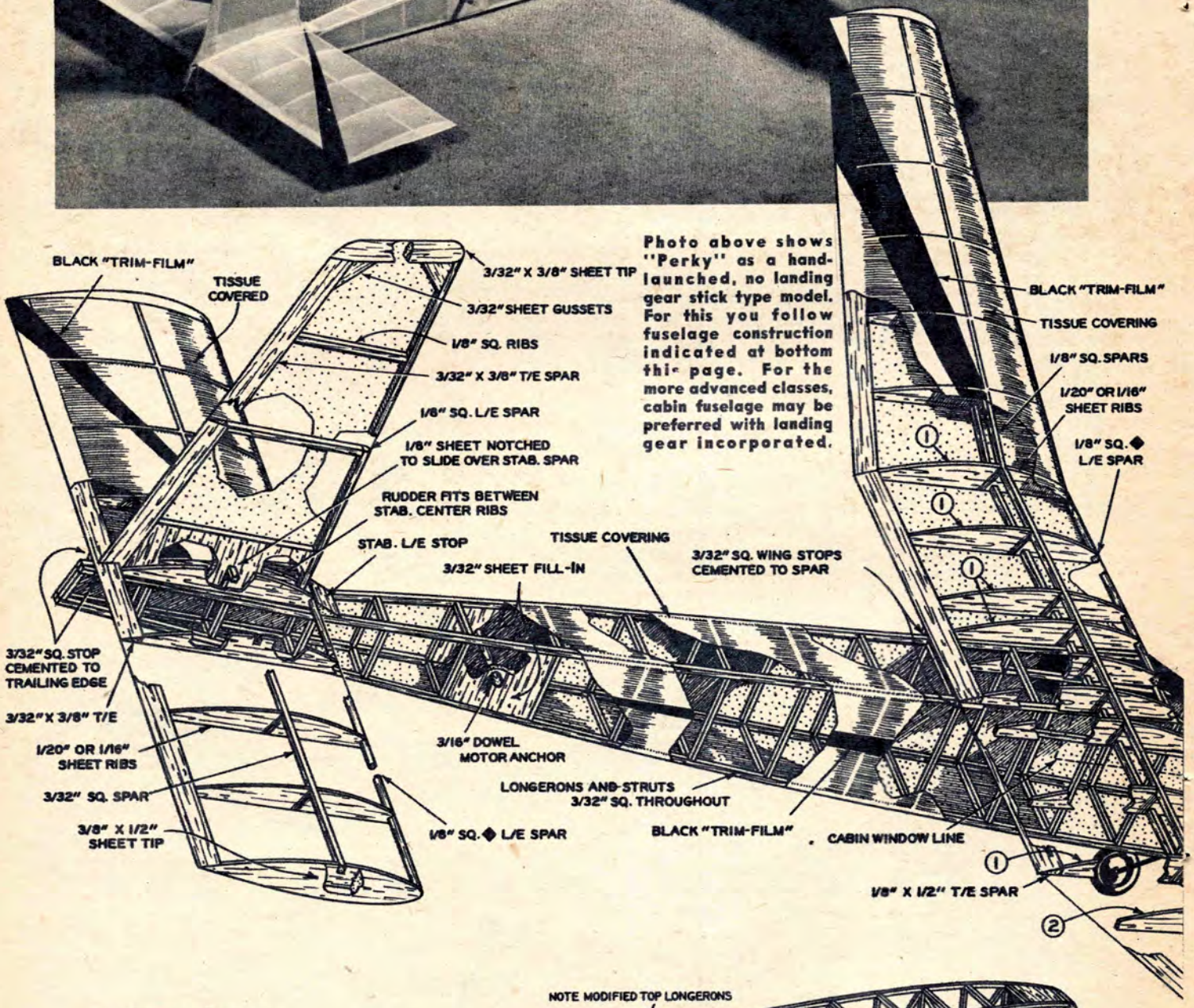
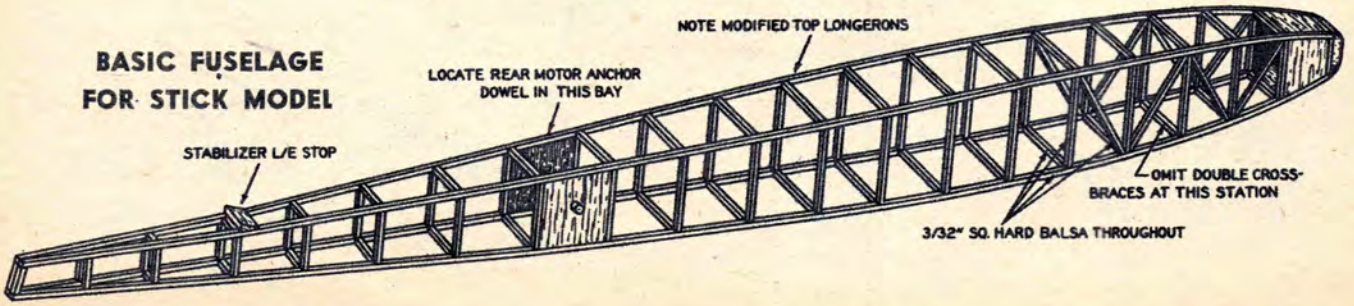


Photo above shows "Perky" as a hand-launched, no landing gear stick type model. For this you follow fuselage construction indicated at bottom this page. For the more advanced classes, cabin fuselage may be preferred with landing gear incorporated.



BASIC FUSELAGE FOR STICK MODEL


NOTE MODIFIED TOP LONGERONS
LOCATE REAR MOTOR ANCHOR DOWEL IN THIS BAY
STABILIZER L/E STOP
OMIT DOUBLE CROSS-BRACES AT THIS STATION
3/32" SQ. HARD BALSA THROUGHOUT

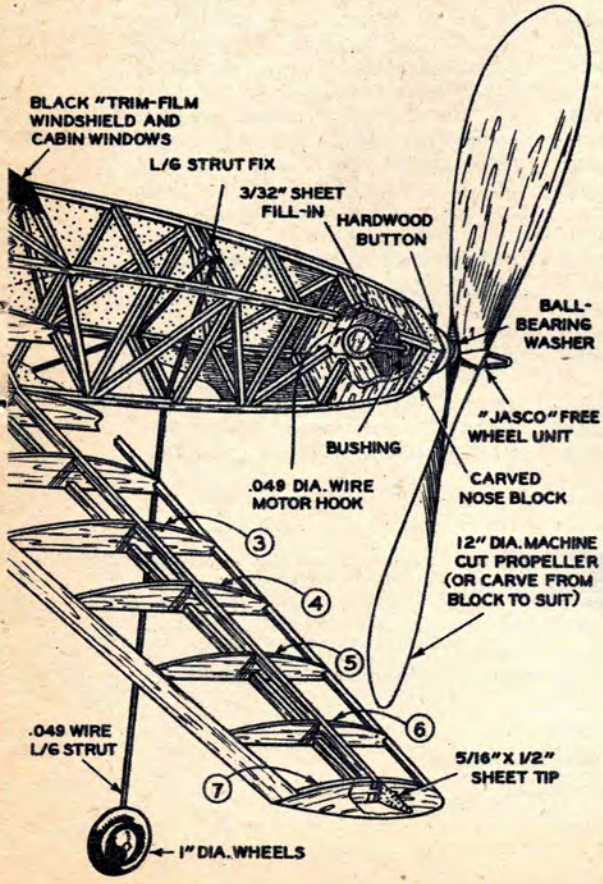
Perky

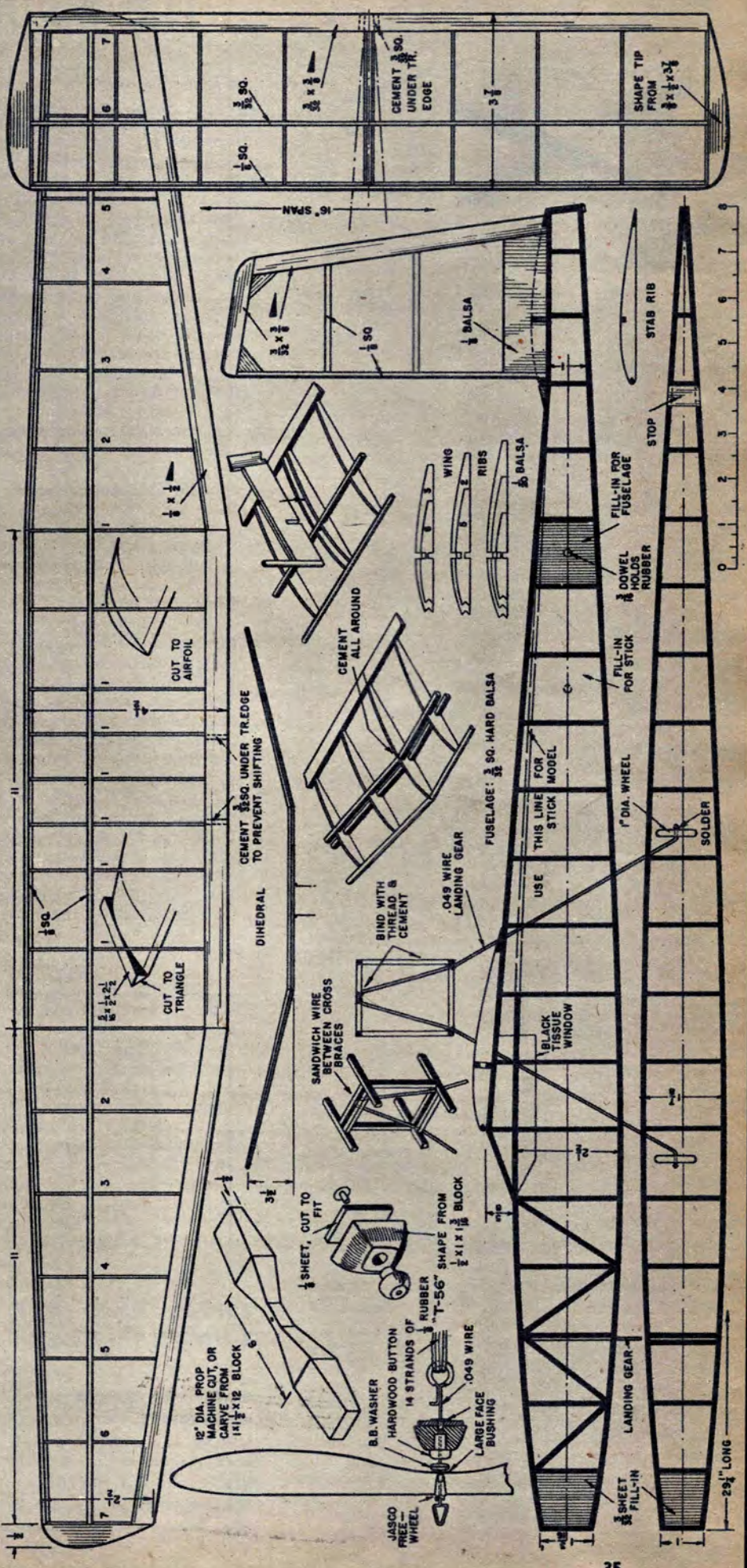
Specially designed for group work, this quite husky little rubber-powered trainer may be built as either a cabin craft or "stick type" model

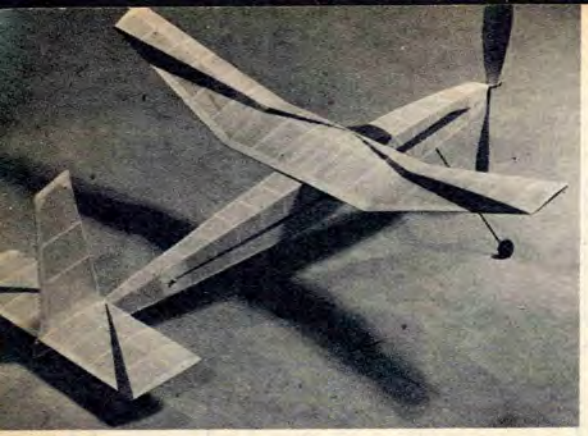
By OLD-TIMER

■ Fulfilling requests from Air Adventurers clubs, Air Scout groups, schools and recreation centers, AIR TRAILS has prepared "Perky"—the rubber-powered trainer which will get the novice air model fan off to a good start on his or her aviation career.

To every would-be modeler let us state most emphatically that it's far wiser to begin with a rubber model than to rush into gas-engine-powered operations. You'll be a better modeler for every rubber-powered plane you build. And don't let anyone tell you that such craft are "too easy"! You must learn to cope with strong bursts


BLACK "TRIM-FILM WINDSHIELD AND CABIN WINDOWS
L/G STRUT FIX
3/32" SHEET FILL-IN
HARDWOOD BUTTON
BALL-BEARING WASHER
"JASCO" FREE WHEEL UNIT
BUSHING
.049 DIA. WIRE MOTOR HOOK
CARVED NOSE BLOCK
12" DIA. MACHINE CUT PROPELLER (OR CARVE FROM BLOCK TO SUIT)
.049 WIRE L/G STRUT
5/16" X 1/2" SHEET TIP
1" DIA. WHEELS





Here's the cabin and landing gear version. Although design is conventional and simple, it's a perky little flyer. 14 strands (7 loops) of T-56 rubber are used as motive power.

of power in the initial flight stages and handle correctly the rapid falling off of power which occurs when the motor unwinds.

The fuselage sides are made of 3/32" square balsa. Build two sides one atop the other, using pins alongside the longerons to keep them in place. Do not pierce the longerons with the pins, for this will weaken them. The nose section is filled in with 3/32" sheet balsa—also the section which will hold the dowel. Note that the stick model dowel is located forward of the cabin model dowel. The stick model does not have a landing gear to help balance the model, therefore the rubber length must be shortened to hold the center of gravity position in approximately the same place.

When the fuselage sides are dry remove them from the plan. Leaving the rear section cemented together, separate the forward part and add the cross pieces starting from the front. Add the fill-in at the nose and double the cross pieces at the landing gear position on the cabin model. The gear is bent into shape over the plans and then cemented into position. The nose block is now carved to shape.

Use the fuselage as a guide and carve the plug from the fuselage to the nosebutton. Add the ⅛" sheet key to the back. This should fit the nose of the fuselage tightly. If a machine-cut prop is used, sand it smooth and insert the shaft and freewheeler and then the winding hook at the front as shown. The wheels are held in place by a small drop of solder on the axle or by a Sullivan Nylon wheel retainer. Sand the entire fuselage with sandpaper block. Make sure every joint is securely cemented, for while sanding the surfaces some may have been removed. Give the fuselage a coat of dope and set aside to dry.

The wing is made next. Start by cutting the required ribs. Lay the leading and trailing edge and bottom spar directly over the plan. Then cement the ribs in place. When dry raise the tips to the dihedral angle shown with blocks while the center section is (*Continued on page* 59)

The Air Adventurers Club

■ Learning about aviation is one of the many privileges of young people living in this age. But a number of you young Air Adventurers seem to be at a loss as to just where to go to find the answers to your questions. Every once in a while we receive a letter from an Air Adventurer with the confusing request: "Please send me some aviation information!"—and there you have us stumped.

When there is a request for specific data we can usually dig up the answers, but "some aviation information" is a bit more difficult to wrap up and ship off to a member. As a means of saving you time and fruitless correspondence in trying to locate accurate and qualified sources of specific aviation answers, here is that very information. Save it with your other Air Adventurers Club material, for it may be of continued value as you study for the various awards, and your own future in aviation.

In the first place your general fund of aviation knowledge can be materially increased by reading AIR TRAILS and AIR PROGRESS. These are written and edited by experts and their articles and features are the tops in up-to-the-deadline data on every development.

Your local libraries are usually stocked with the new aviation books and references almost as soon as published, but many students neglect to check with their librarians regarding such new additions to their shelves. It will pay you well to keep in touch with your library.

Your newspapers all carry aviation items and not infrequently special departments and columns devoted to airmen and aircraft. This material is either supplied by the top writers of the big wire services or the local paper's aviation editor. Such expert reporters are in themselves excellent sources of aviation answers to your problems and questions. The vast majority of aviation writers, reporters, editors and public relations men are members in the Aviation Writers Association. Such members are frequently willing to address local clubs or aviation study classes seriously interested in this field.

Now where to go for specific aviation data. If you Air Adventurers are interested in particular types or models of aircraft, we suggest that you write directly to the manufacturer of such aircraft. Address your letter to the Director of Publicity or Public Relations and state exactly what you want to know and enclose a stamped, self-addressed envelope for their convenience.

Many companies have reproductions of photos of their planes, which they will send to serious letter writers—provided you do not request "as many as possible" or "one of every airplane you have built". Some manufacturers also have excellent three-view plans of their more popular models that may be had for the asking. The addresses of most manufacturers may be obtained from the pages of all types of aero publications, or such reference directories as the American Aviation World-Wide Directory, which your library may carry. When writing to such sources be brief, be polite, and not too demanding of material, and your request may receive a prompt and helpful answer with some very well-worth while material.

Many government or national organizations have valuable aviation study material available for either no charge or a minimum fee. Contact the Civil Aeronautics Administration, Commerce Building, Washington 25, D. C., for a list of their many excellent aviation publications and text books, and also the Government Printing Office, Washington, D. C., for their list of similar publications and their prices. Most of them cost but a few cents each, cover almost every phase of aviation and are prepared by experts. And don't forget the aviation schools whose ads appear each month in "AT".

For information relative to flying safety contact the Flight Safety Foundation, at 2 East 64th Street, (*Continued on page* **70**)

JOIN THE AIR ADVENTURERS!

Membership is open to all air-minded citizens, regardless of age. Membership card, manual and credentials are 25c; all this plus the distinctive lapel emblem pin is 50c. Join now, help make and keep America first in the air.

MAIL TO: Air Adventurers, c/o Air Trails, 304 East 45th Street, New York 17, N. Y.

I hereby apply for membership in the Air Adventurers Club and promise to do everything in my power for the advancement of American aviation. I enclose 25c in well wrapped coins for my credentials ☐; 50c for credentials *and pin* ☐—(indicate which).

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(Name—print)

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(Street address—print)

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(City—print) (Zone) (State)

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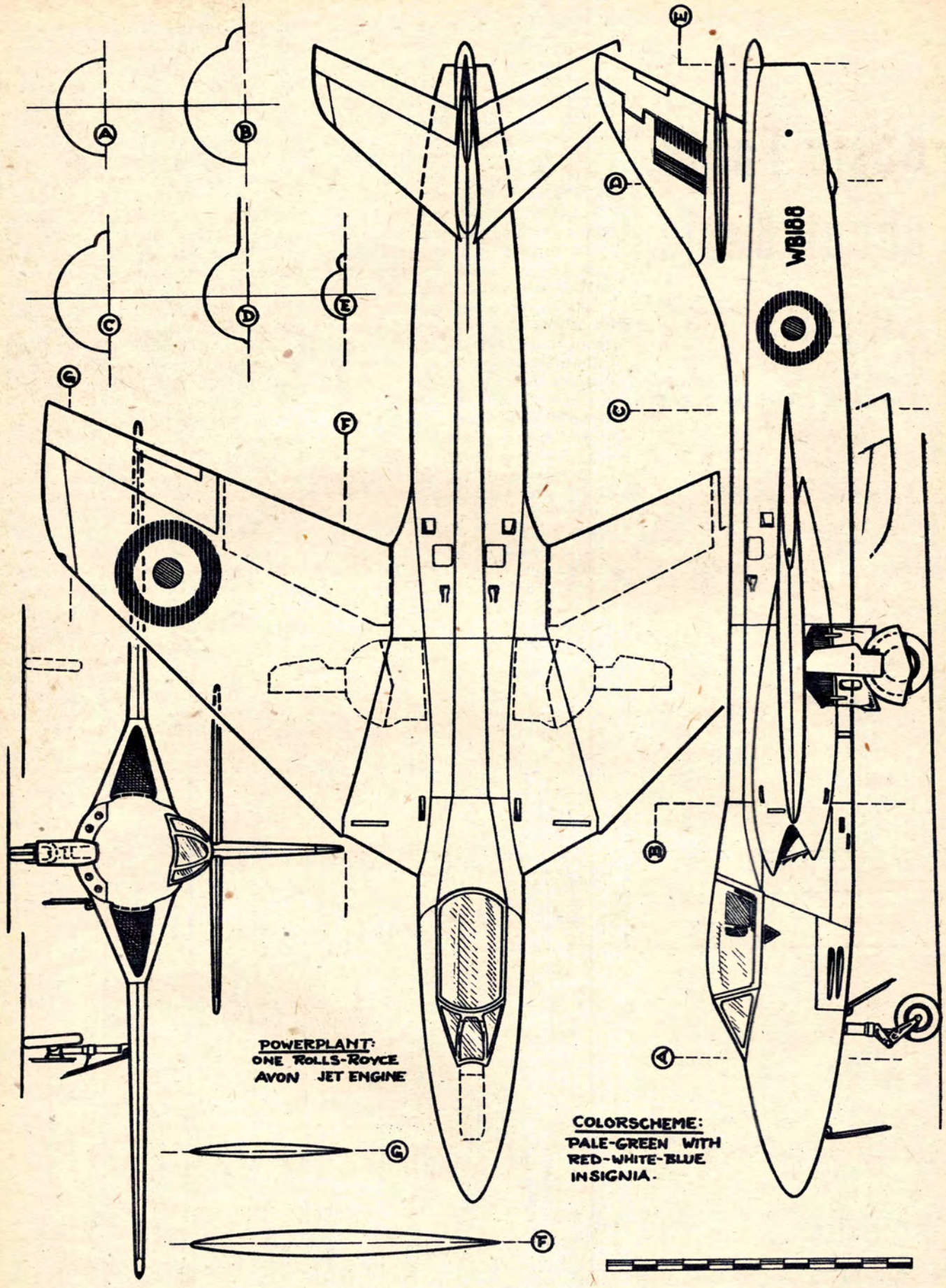
(Age) (Sign here)

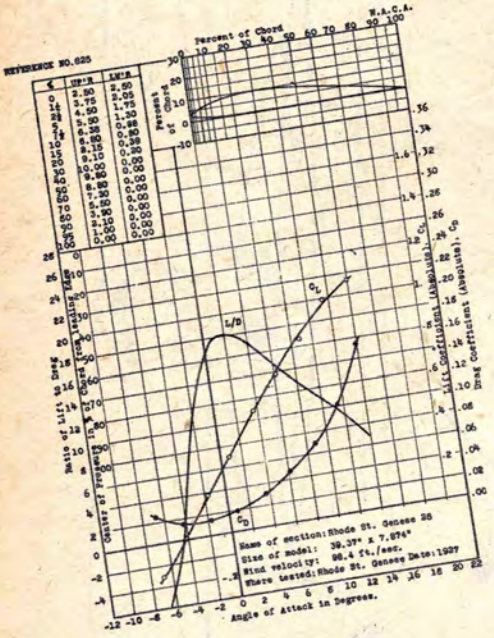


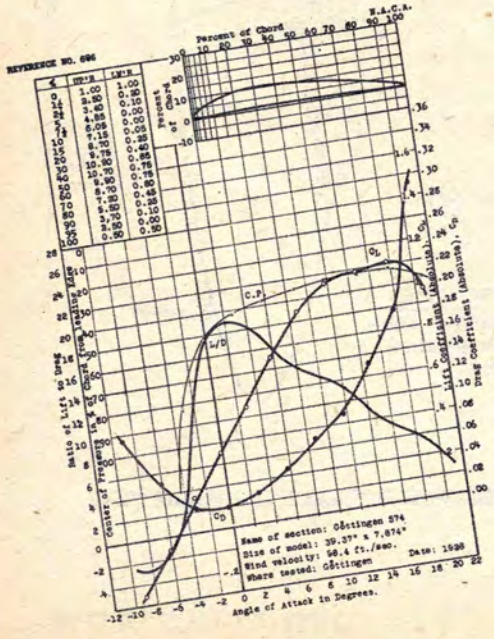
Hawker Hunter

Scale 3/16" equals 1' By BJORN KARLSTROM

Basic Facts about Basic Airfoils

By FRANK ("Circular") ZAIC


Name of section: Rhode St. Genese 26
Size of model: 39.37" x 7.874"
Wind velocity: 98.4 ft./sec.
Where tested: Rhode St. Genese Date: 1927
Angle of Attack in Degrees.


Name of section: Göttingen 574
Size of model: 39.37" x 7.874"
Wind velocity: 98.4 ft./sec.
Where tested: Göttingen Date: 1928
Angle of Attack in Degrees.

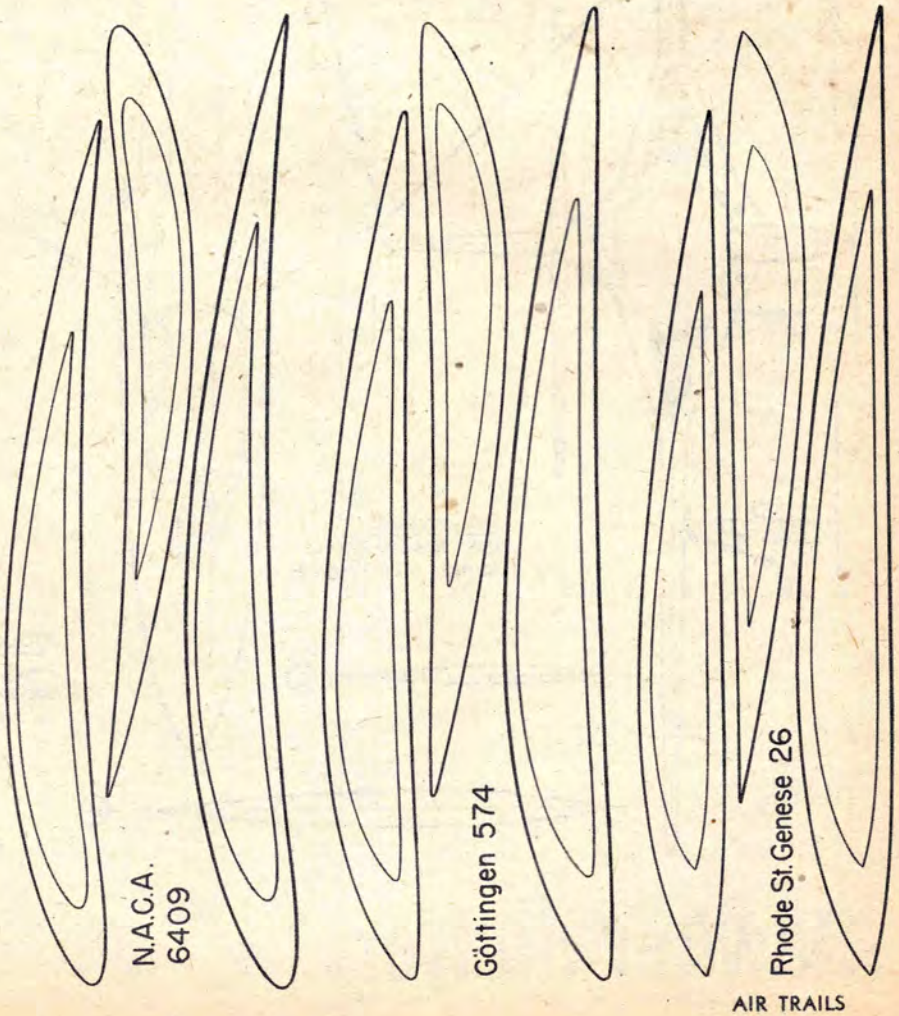
■ When two airfoils are moving at the same speed, and develop similar lift, their drag values are also similar although one airfoil may be the deeply undercambered NACA 6409 and the other extra thin U.S.N.P.S. 1. However, their angles of attack will not be the same. NACA 6409 may develop as much lift at 2 degrees as the U.S.N.P.S. 1 does at 6 degrees.

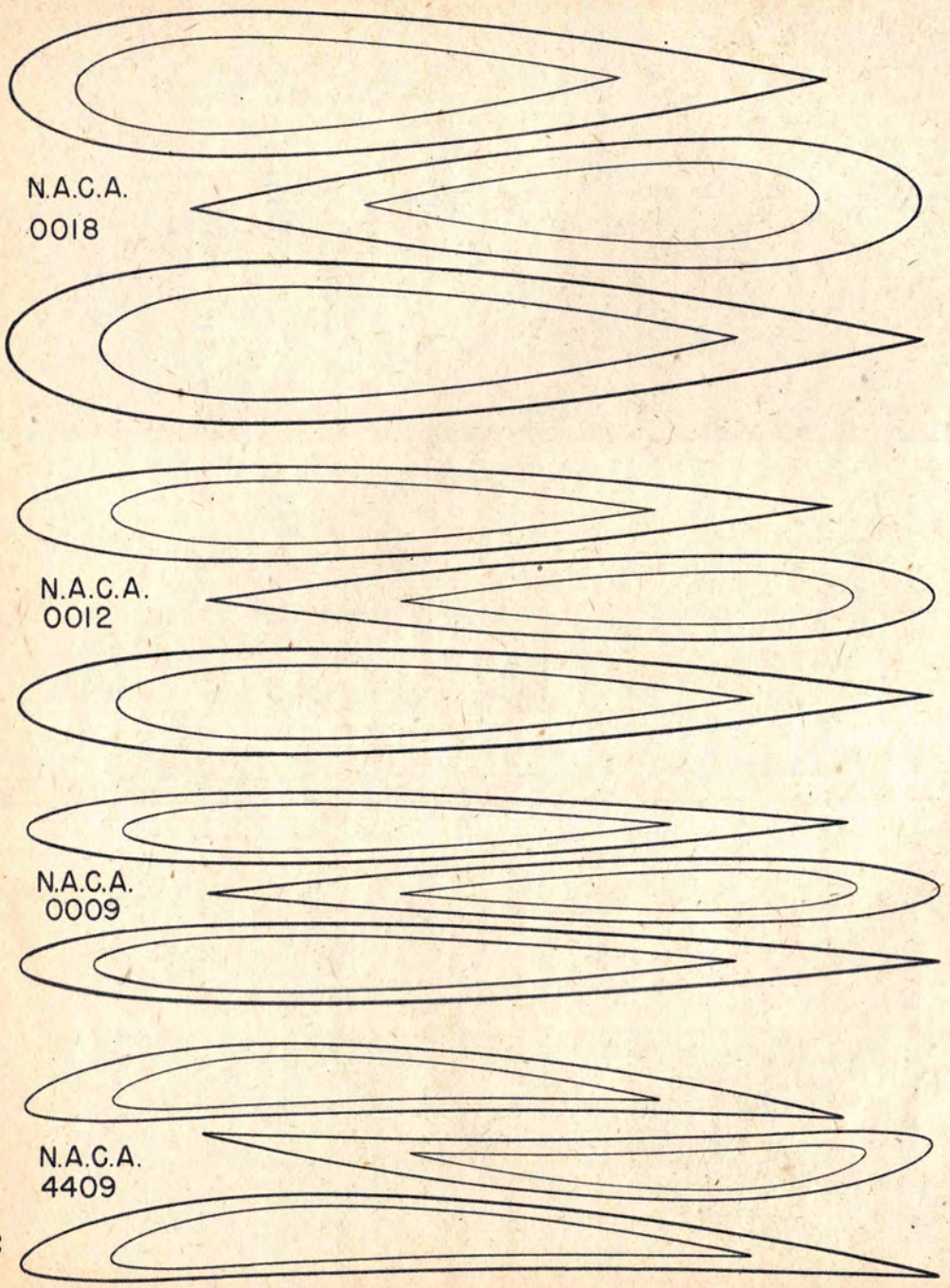
Before you make any conclusion, let us remind you that practically every airfoil used on free flight models stalls around 6 deg. So you can see that NACA 6409 can still go 4 deg. higher before it stalls, while the other airfoil has already reached its maximum. This is an interesting point to remember when we consider that the maximum glide "duration" is achieved while the airfoil is close to the stalling point. The advantage of NACA 6409 over the U.S.N.P.S. 1 in a glide is obvious.

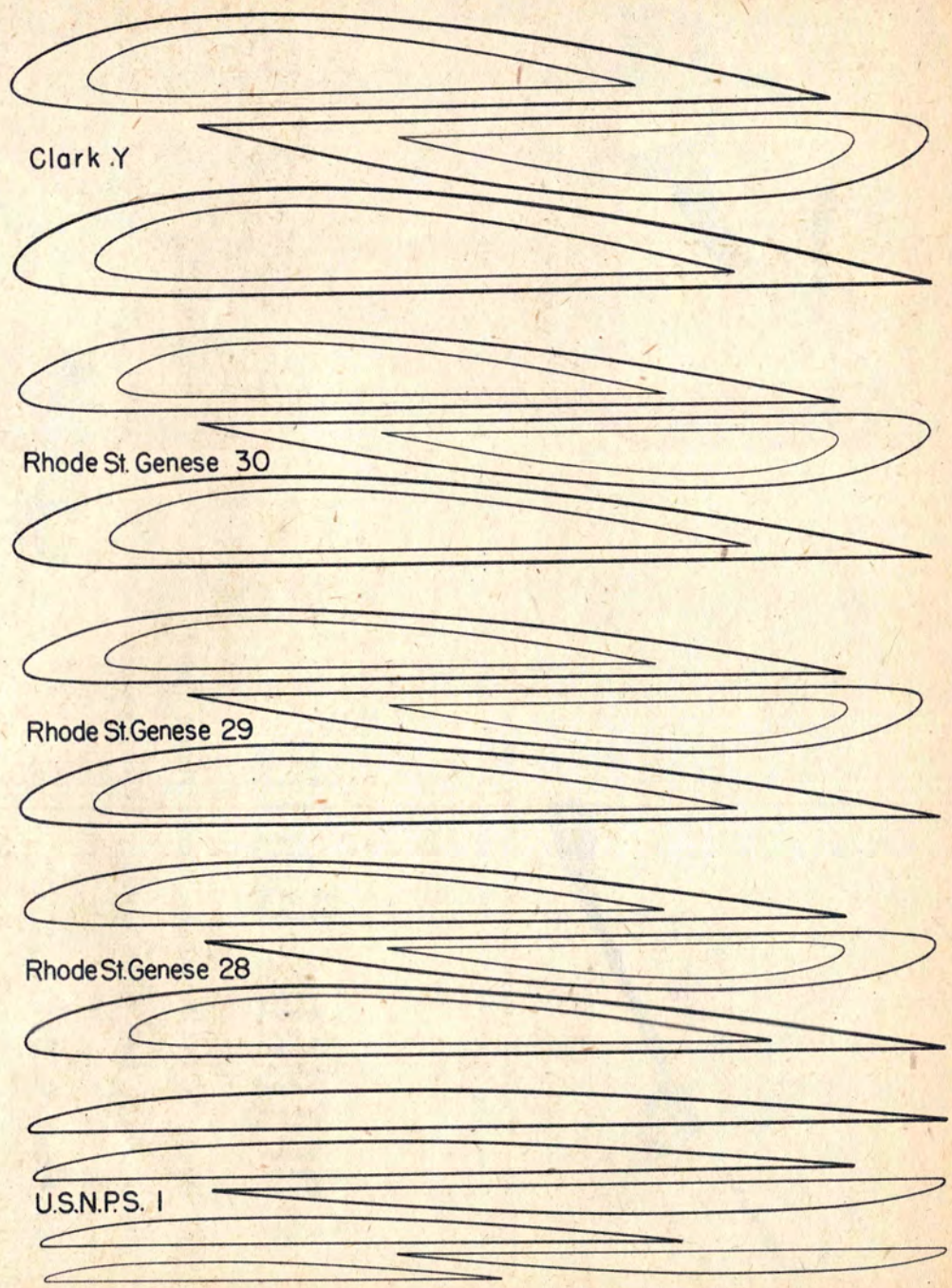
"Then why do we use thin airfoils?" you ask. Here we go into another phase of the flight, the power portion. The power we have now is capable of lifting the model straight up—no need for the wing except to control the torque and keep the model from twisting. All this means that while the model is under "high" power the wing may develop much less lift than the weight of the model. So here we have a peculiar situation: the model is trimmed for maximum or stalling angle, while we need practically no lift under power.

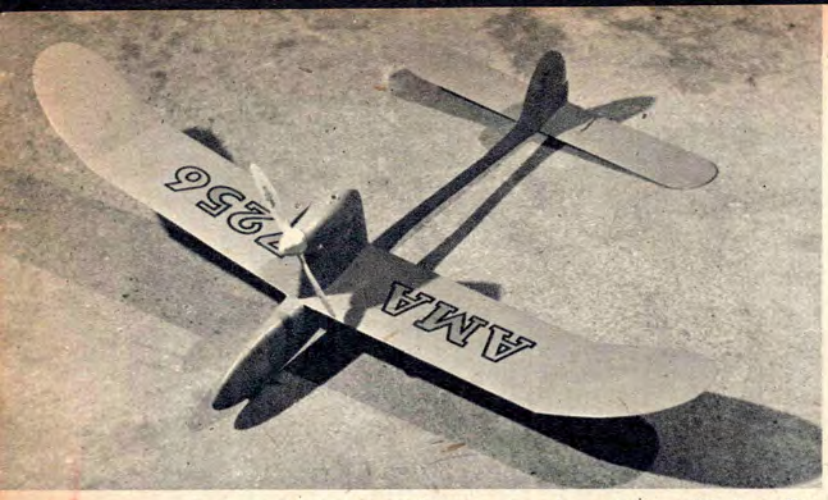
If the model was actually operating at the glide trim angles, most of the wings would crack up, since the lift generated would be three to four times the weight of the model. What happens is that the model automatically adjusts itself so that the wing flies at lower angles of attack. It may shift from 6 deg. glide trim to zero deg. power trim, at which point it may develop less lift than the model's weight. All this has been going on since models began to fly, but no one suspected this blessing until the "Circular Airflow Theory" was developed.

Where do the thin and thick airfoils come in on this? Well, say that an 8 oz. model needs 4 oz. wing lift under power (the prop thrust takes care of the other 4 ozs.). Here is the payoff: a thin airfoil may only have to move from 6 deg. to 2 deg. to develop the 4 ozs. lift. But a deeply undercambered airfoil may have to move to a minus 2 deg. to develop the required 4 ozs. Thus we have a difference of 4 deg. between the two and 8 deg. (*Continued on page* 80)




N.A.C.A.
0018
N.A.C.A.
0012
N.A.C.A.
0009
N.A.C.A.
4409


Clark Y
Rhode St. Genese 30
Rhode St. Genese 29
Rhode St. Genese 28
U.S.N.P.S. 1



In powered form, G.G. takes engines from .035 to .099, but offers contest performance even with the smallest because of clean design.

Profile views of G.G. and the designer P.D.G. You'll note that the model is by far the more streamlined! Towline version is below.

Gorgeous Gertie

A winner in 1952's Mirror Model Flying Fair, this five-way free flight took top beauty honors

By PAUL E. DEL GATTO

■ What do you prefer in a design: flyability, versatility, originality or ease of construction? Whatever your preference, you'll find *Gorgeous Gertie* has them all. Here is the answer to the free flight modeler who says he can't find the time to build a contest towline model, or for the towline modeler who makes an opposite claim.

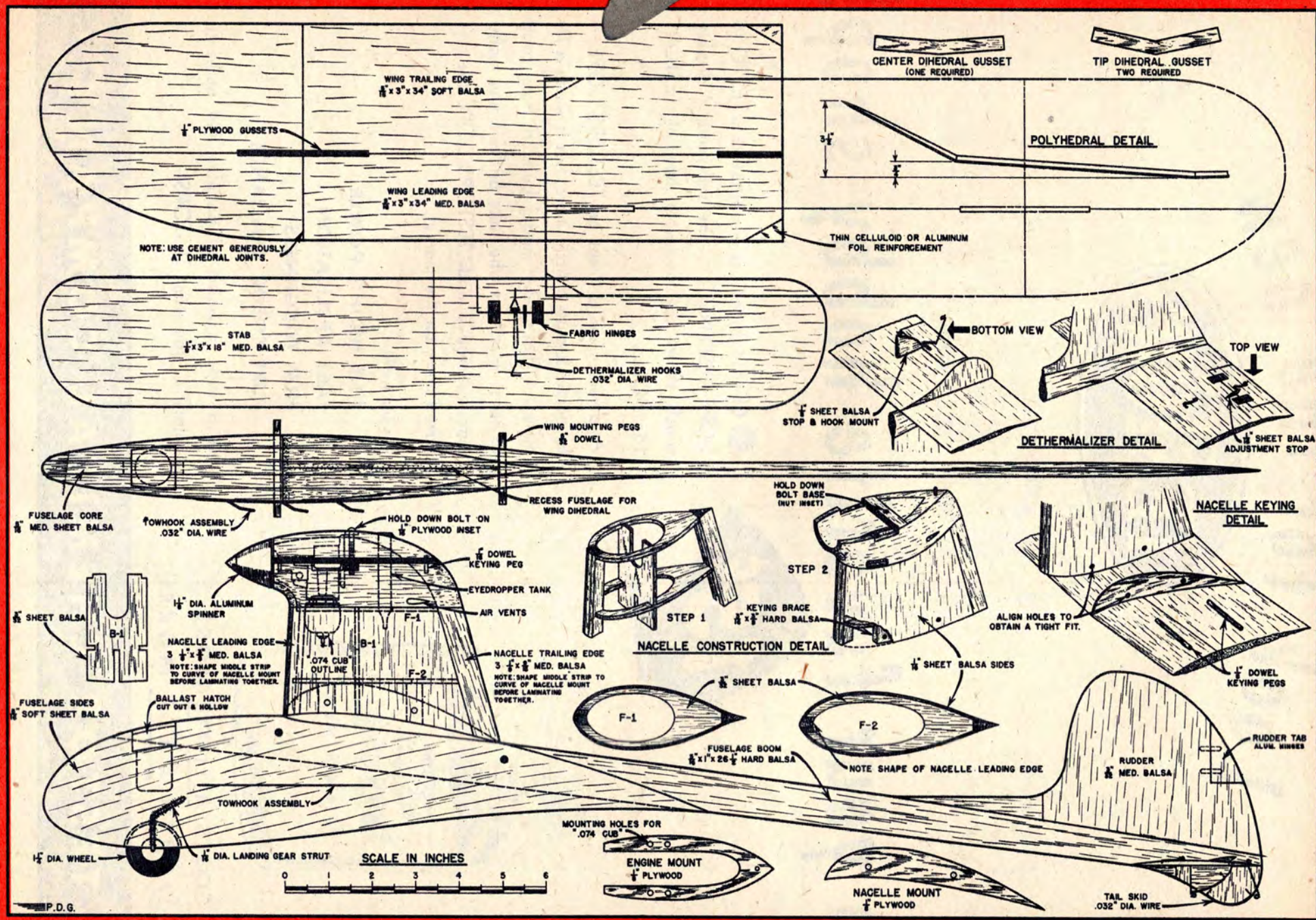
Originally the design started out as a combination all-balsa hi-start and towline with the accent on streamlining and simplicity, but while in the midst of evolving the basic configuration, we struck upon the idea of making it a gas free flight as well. Since there was no problem as to where to locate the ignition, it was a fairly simple matter to design a compact nacelle which could be keyed in position above the wing.

When completed we found *Gertie* could be flown five different ways: hi-start, towline, Class AA free-flight, Class A free-flight and sport. It performs with equal merit whether it is flown as towline or free-flight gas.

As a towline it lends itself beautifully to flying, even under adverse weather conditions. The design is stable, climbs steadily on the towline and will maintain a tight left spiral with a low rate of descent. Despite the model's small size, performance is comparable to designs of much greater proportions. This can be attributed to the high degree of streamlining that was achieved.

As for gas, believe us when we say that if you're contemplating using an engine of similar power to the .074 Cub that we have used, you had better keep those dethermalizer fuses handy and have the car motor running because the model really travels. Even with the .049 Cub, which is easily interchangeable with the .074 Cub, performance was still contest caliber despite the fact that the model weighed slightly under eight (*Continued on page* 71)

Converting from free flight gas to towline is but the work of a few minutes. Although Gertie balances out differently when flown without power, ballast box speeds trimming.


WING TRAILING EDGE
1/16" x 3" x 34" SOFT BALSA
1/8" PLYWOOD GUSSETS
WING LEADING EDGE
1/16" x 3" x 34" MED. BALSA
NOTE: USE CEMENT GENEROUSLY AT DIHEDRAL JOINTS.
CENTER DIHEDRAL GUSSET
(ONE REQUIRED)
TIP DIHEDRAL GUSSET
TWO REQUIRED
POLYHEDRAL DETAIL
3 1/2"
1"
THIN CELLULOID OR ALUMINUM FOIL REINFORCEMENT
STAB
1/16" x 3" x 18" MED. BALSA
FABRIC HINGES
DETHERMALIZER HOOKS
.032" DIA. WIRE
BOTTOM VIEW
TOP VIEW
1/8" SHEET BALSA STOP & HOOK MOUNT
DETHERMALIZER DETAIL
1/8" SHEET BALSA ADJUSTMENT STOP
WING MOUNTING PEGS
1/8" DOWEL
RECESS FUSELAGE FOR WING DIHEDRAL
FUSELAGE CORE
1/16" MED. SHEET BALSA
TOWHOOK ASSEMBLY
.032" DIA. WIRE
HOLD DOWN BOLT ON
1/16" PLYWOOD INSET
1/8" DOWEL KEYING PEG
EYEDROPPER TANK
AIR VENTS
1 1/2" DIA. ALUMINUM SPINNER
1/16" SHEET BALSA
B-1
F-1
B-1
F-2
.074 CUB OUTLINE
NACELLE LEADING EDGE
3 1/2" x 1/8" MED. BALSA
NOTE: SHAPE MIDDLE STRIP TO CURVE OF NACELLE MOUNT BEFORE LAMINATING TOGETHER.
NACELLE TRAILING EDGE
3 1/2" x 1/8" MED. BALSA
NOTE: SHAPE MIDDLE STRIP TO CURVE OF NACELLE MOUNT BEFORE LAMINATING TOGETHER.
STEP 1
HOLD DOWN BOLT BASE (NUT INSET)
STEP 2
KEYING BRACE 1/16" x 1/8" HARD BALSA
NACELLE CONSTRUCTION DETAIL
NACELLE KEYING DETAIL
ALIGN HOLES TO OBTAIN A TIGHT FIT.
1/8" DOWEL KEYING PEGS
1/16" SHEET BALSA SIDES
1/16" SHEET BALSA
F-1
F-2
NOTE SHAPE OF NACELLE LEADING EDGE
FUSELAGE SIDES
1/16" SOFT SHEET BALSA
BALLAST HATCH
CUT OUT & HOLLOW
FUSELAGE BOOM
1/8" x 1" x 26 1/2" HARD BALSA
RUDDER
1/16" MED. BALSA
RUDDER TAB
ALUM. HINGES
TOWHOOK ASSEMBLY
1 1/2" DIA. WHEEL
1/16" DIA. LANDING GEAR STRUT
SCALE IN INCHES
0 1 2 3 4 5 6
MOUNTING HOLES FOR .074 CUB
ENGINE MOUNT
1/8" PLYWOOD
NACELLE MOUNT
1/8" PLYWOOD
TAIL SKID
.032" DIA. WIRE
P.D.G.

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DOPE DISPENSER

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15¢

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WORTH A LOT MORE!

● Choose the colors you want from TESTORS DOPE DISPENSER . . . the self-vending display which shows the complete line of TESTORS 15c DOPE.

And remember to insist on TESTORS DOPE — *by name!* It costs a *little* more, but is worth a *lot* more . . . That's why model builders from coast to coast — fellows who take pride in fine craftsmanship — have made TESTORS DOPE *the preferred dope* on the market.

If you want

FINE HIDING POWER
EASY APPLICATION
FILM TOUGHNESS
PURE COLOR BRILLIANCE

in a wide selection of popular and authentic colors . . . you want TESTORS!

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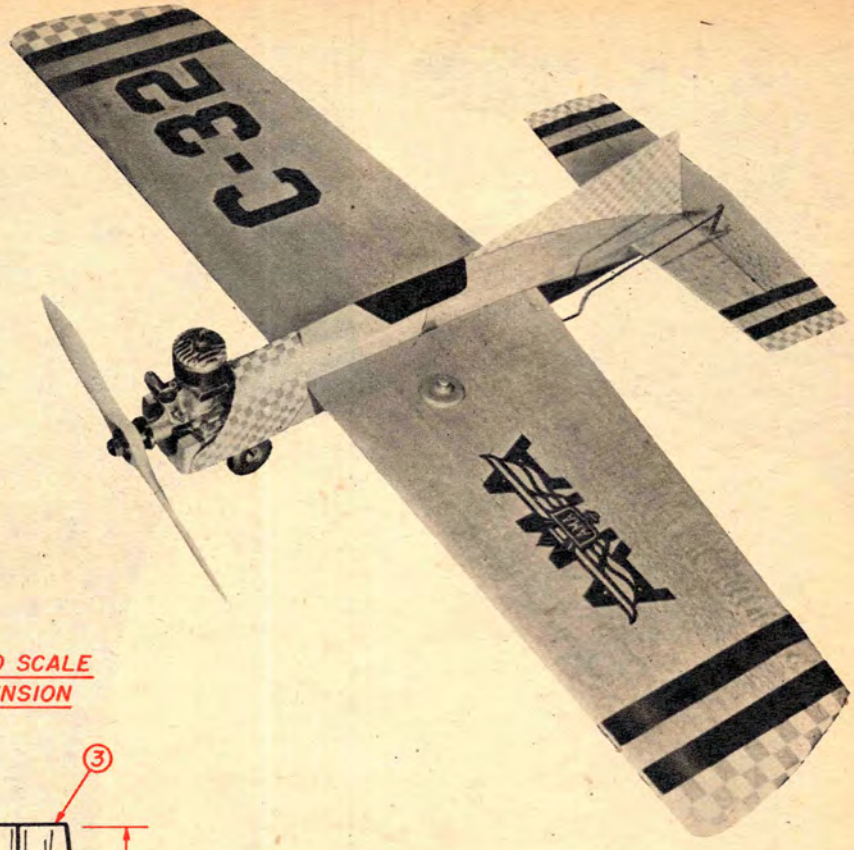
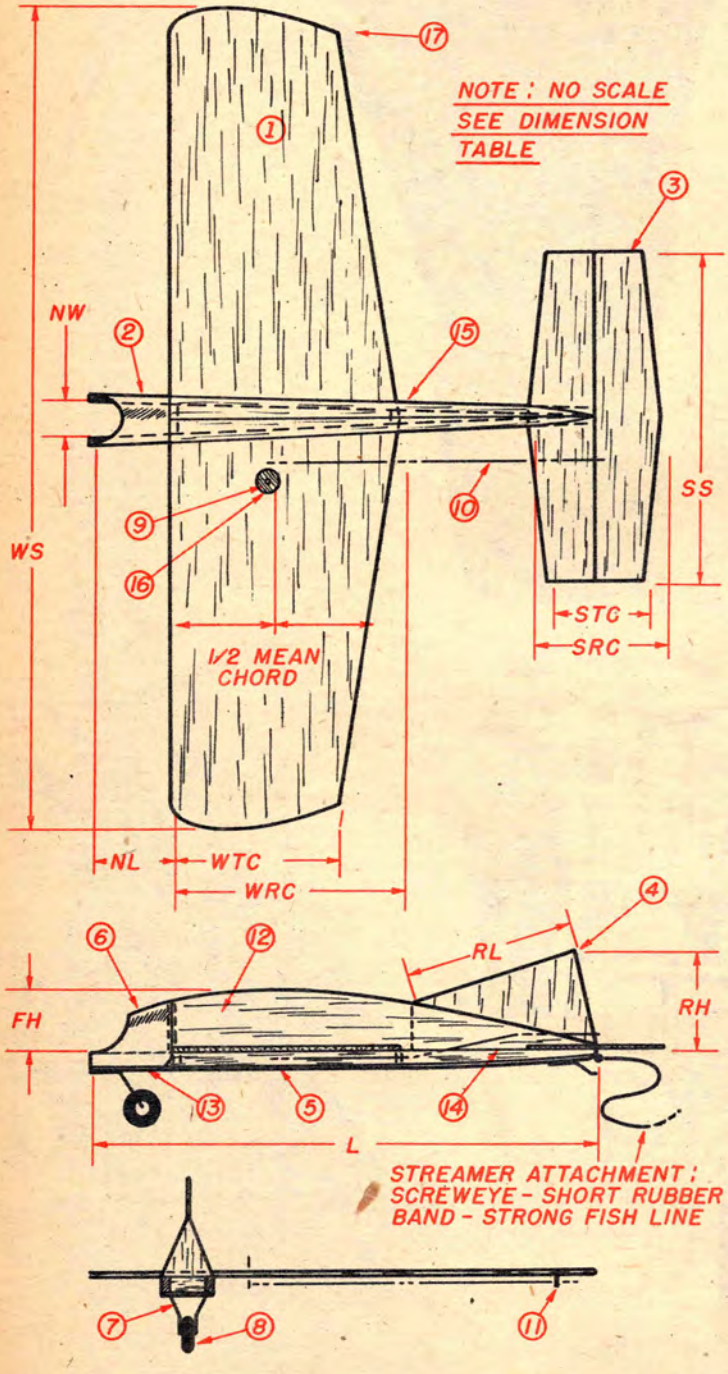
ROCKFORD, ILLINOIS

The Combat Kid





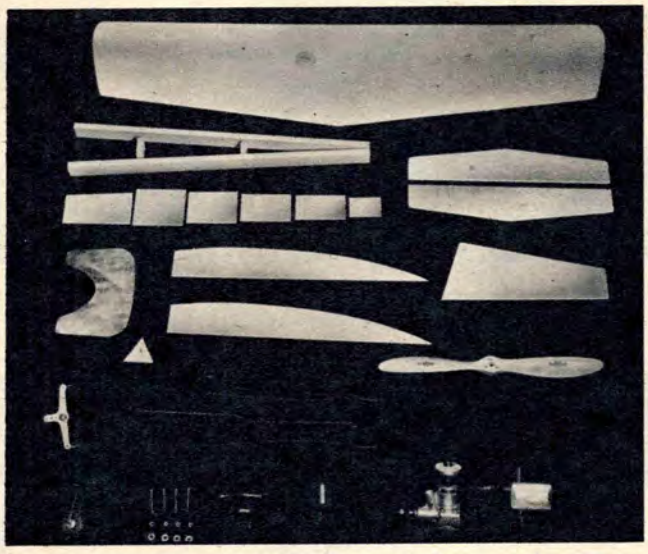
■ To win a combat event, either the flyer or the model has to be better than the competitor. This model can scoot by the best in the circle, and by virtue of same will be flying high. When your competitor passes below, you can dive at will, and zoom up again before he realizes what happened.

This is all nice to do, and yet with the best of us there arrives the time when the ground seems to come up a little too soon; and that is where this ship takes a real bow. The engine bearers run to the rear of the model, which pretty much eliminates the chance of them breaking out. The wing is of all sheet balsa rounded off at the edges. It is extremely easy to make and can be cemented quickly in the event of a crack-up since there is no covering to patch. The landing gear was left off and only a short arresting gear used to keep the bottom of the model from wearing out on concrete runways. All these points are important when you enter a combat circle.

The model is not classed as to size since it can be made to fit whatever engine you wish. The size and material specifications are listed in the chart. Whatever engine you use, be sure that the power is high and that the outside wing tip is weighted to keep the model "out" as you need to rivet all your attention on the other fellow's ship and yours should be able to fly itself—yet be able to respond to your every command.

A good supply of cemented bandage, prepared on a sheet of metal with some fast-drying cement and peeled off in a roll, will come in handy when field repairs are to be made. Merely wipe the broken area with some thinner and cement the parts together. Then while cement is still drying, bind the bandage over the broken joint and it will be as good as new. Use a fuel proof that can be cemented over without crazing as an aid in repairing.

If you want to win a combat event you will have



Simplicity, ruggedness, ease of repair are what you want in a combat model. The "Kid" has all three and mighty few parts as photo shows.

DIMENSION & MATERIAL TABLE

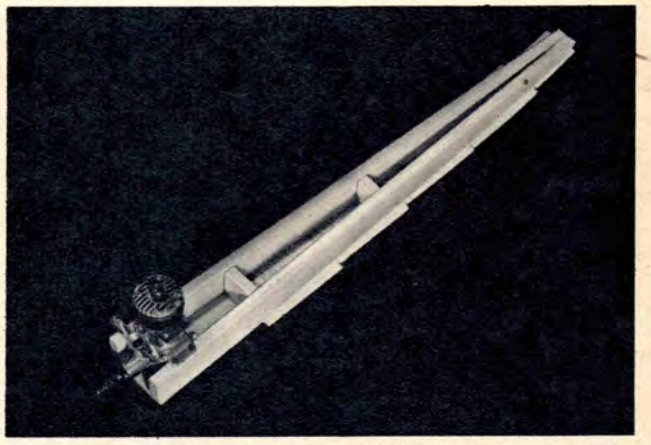
KEY	PART	ENGINE CLASS .045-.09	.19	.29-.32
WS	WINGSPAN	20"	25"	30"
WRC	WING ROOT CHORD	5-5/8	6-1/2	8
WTC	WING TIP CHORD	4	4-3/4	6
SS	STAB SPAN	8	9-1/2	12
SRC	STAB ROOT CHORD	3-1/4	3-3/4	4-3/4
STC	STAB TIP CHORD	2-3/8	2-3/4	3-1/2
RH	RUDDER HEIGHT	2-3/8	2-3/4	3-1/2
RL	RUDDER LENGTH	4	4-3/4	6
NL	NOSE LENGTH	2	2-1/2	4
NW	NOSE WIDTH	TO SUIT ENGINE		
L	FUSELAGE LENGTH	12-3/8	14-3/4	18-1/2
FH	FUSELAGE SIDE HT.	1-1/2	1-3/4	2
1	WING STOCK	1/8	3/16	5/16
2	ENGINE BEARERS	3/16X3/8	1/4X1/2	3/8X1
3	STAB STOCK	1/16	1/8	1/8
4	RUDDER STOCK	1/16	1/8	1/8
5	FUSELAGE BOTTOM	1/16	3/32	3/32
6	ENGINE COWLING	TIN CAN STOCK		
7	L. G. WIRE DIA.	.035	1/16	3/32
8	WHEEL DIA.	7/8	1	1-1/4
9	1/16 PLY. WASHER – DIA.	1/2	3/4	1
10	PUSH ROD WIRE DIA.	.040	1/16	1/16
11	WING GUIDE – PLY.	1/16	1/8	1/8
12	FUSELAGE SIDES	ALL 1/16 SHEET		
13	NOSE BOTTOM – PLY.	—	3/32	1/8
14	FUSE. TOP COVER	1/8	3/16	5/16
15	FUSE. CROSS PIECES	SAME AS BEARERS		
16	BELLCRANK	2	3	3
17	WING TIP WEIGHT – OZ.	1/2	1	1-1/2
18	TOTAL WEIGHT – APPROX.	5 OZ.	11 OZ.	16 OZ.

By FRANK EHLING

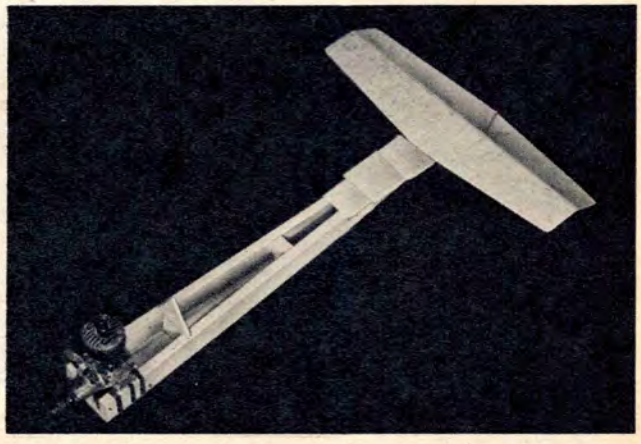
to take a few chances, for those who do seem to be the ones that carry off the prizes; but they have their bad moments, too. With the *Combat Kid* you're off to a good, fast start.

Here is the construction procedure:

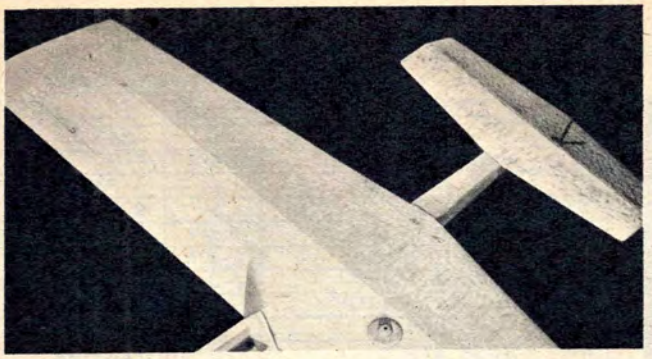
1. Bolt the engine to the bearers. Taper them at the rear to reduce the tailweight. Cement the rear of the bearers together. Cement the 1/8" sheet balsa to the bottom. Tack-cement the 1/8" plywood to the forward part. Let dry thoroughly.
2. Remove the plywood plate and bind the bearers with thread around the engine holes. Re-cement the plywood plate and trim the complete bottom sheeting. Cut the tail assembly out and cement the hinges in place; be sure that these are free moving. Cement the stabilizer in place along with the 1/8" sheet top covering between the wing and stabilizer.
3. Cement the wing from the required number of sheets that it takes and round the edges. Locate the bellcrank hole and cement two plywood washers to it, along with two wood nose buttons. Cement the wing in place, along with the balsa triangle firewall. Be sure that the wing is cemented on straight.
4. Cut the rudder out by cementing the required number of sheets together to make up its outline. Round the edges of the rudder and cement it to the top of the fuselage.
5. Cut the outline of the fuselage to shape. These will not add any strength to the fuselage; they are used to streamline the tank and steady the rudder. Cement one side and see that in cementing it to the fuselage that the rudder is not pushed out of line.
6. Cement the remaining side in place and cement all the edges well. When dry, cement again as this will stiffen the edges and preserve them. Sand smooth, and give the entire model a coat of dope to preserve the wood.
7. Install the tank and engine, making sure that the tank feeds when the model is dangled by the lines. This will be proof that the engine will run well when the model is flying.
8. The cowl is cut out of a tin can and bent to shape. Punch the holes for the wood screws to hold the cowl to the engine bearers.
9. Bend the pushrod to shape using the "Z" bend as this is helpful to "zero" the controls whenever needed. Assemble the bellcrank and pushrod and bolt in place. Cement the plywood guide in place and lead the lines out.
10. Bend the arresting gear to shape and install the gear on the bottom of the fuselage, using the engine bolts to hold the gear in place. The tail skid is bent to shape and held in place with a tin plate and wood screws.
11. Sand the entire fuselage, wing and tail with fine sandpaper and re-dope. Repeat this until the wood is smooth (about four coats of dope). Fuel proof the entire model. This will preserve its life.



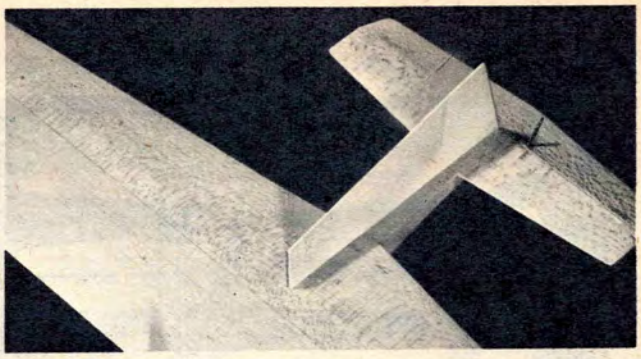
First, bolt engine to bearers, taper these at rear to save weight. Plywood bottom at front under engine is tack-cemented.



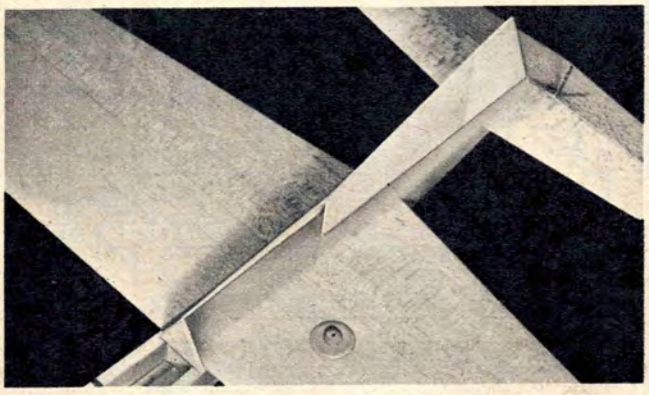
Bind bearers with thread around engine holes after you've taken off plywood. Then cement plywood permanently in place.



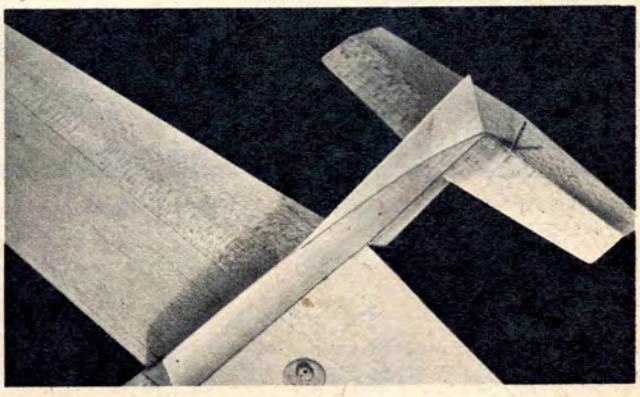
Butt-cement necessary balsa sheets to form wing; plywood washers and wood buttons provide anchor for bellcrank. Add firewall.



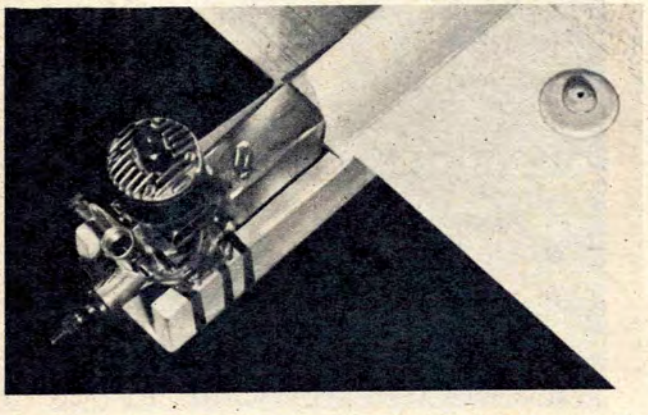
You begin to form the fuselage by adding rudder. Note grain pattern on sideview; butt-cement together needed number of sheets.



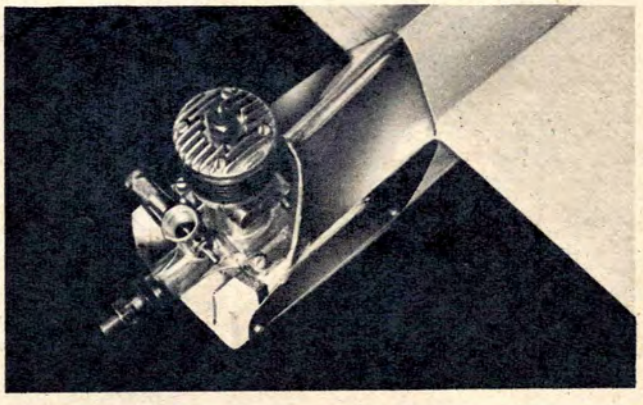
Fuselage really takes shape when you add one side. Work carefully here so that addition of sheet sides does not misalign rudder.



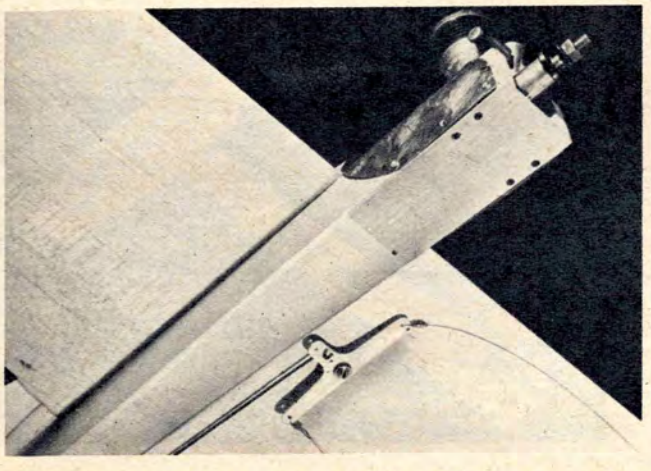
Other side goes in place. When dry, recement all edges for strength. You just can't make a combat model *too* strong and cement's cheap!



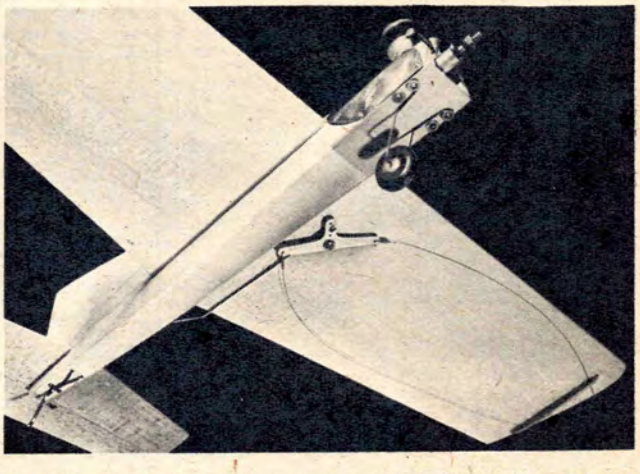
Then the tank and engine are put in position. And right now is the time to determine if the engine will run properly at every angle.



Here's where the lowly tin can comes in for some real recognition. Get proper pattern by bending light cardboard, then cut from can.



The "Z" bend in pushrod is important. If elevator gets out of true neutral when bellcrank is 90 deg. to wing, correct by bending wire.



Arresting gear is shaped and wheel installed. Finish off model with 4 coats of dope, then fuelproof thoroughly. This makes model last.

R/C PRIMER:

Moving the Control Surfaces—II

In this concluding report AT's R/C columnist covers the very fascinating field of proportional control

By HOWARD G. McENTEE

■ In our recent July issue the opening "primer" article outlined the basic methods of moving the control surfaces of a modelplane equipped with a radio receiver. Without getting too technical we moved down the line to proportional control—a subject of much interest to would-be R/C'ers, but one which has been obscured frequently by too much mumbo-jumbo. Let's see how simple we can keep an explanation.

There are several types of control that might be called semi-proportional, which are very simple, yet have considerable advantage over the plain motor drive, such as that illustrated in Fig. 1 of previous article. Suppose, for example, that the equipment in the plane be changed slightly to that in Fig. 8 shown here; at the transmitter, instead of a plain pushbutton, we add a mechanism to turn the transmitter on and off continuously, the on and off portions of transmission being of equal duration.

If this equipment were connected to the transmitter and set into operation, the motor in the airplane would go forward and back so rapidly that the rudder would hardly move. If the transmitter were keyed to send a steady signal, the rudder motor would be able to move to the left, let's say, while if cut off entirely it would move to the right. The movement could be stopped and held at any desired degree of rudder deflection by turning on the pulsing mechanism.

Such a system is quite satisfactory and can give very good results. Some flyers have built the pulsing units from relatively inexpensive electric train motors, using the gear train supplied, and simply filing one wheel flat to act as a cam. A pulsing speed of around 200 per minute is a good average to start with. A lever-type switch that has three positions may be hooked up as in Fig. 9 to give the required results.

For such use, it is desirable to fit the motor in Fig. 1 with what are termed limit switches. These switches stop rotation of the arm on the gear box at a definite position each side of center. Connections of the switches are such that when the arm is stopped at one limit, the motor can always be made to turn back the other way.

Another approach to proportional control is possible with the simple magnet-operated rudder of last article's Fig. 2; the stops must be reset so that full signal will give, say, left rudder, and no signal, right. Using (*Continued on page* 54)

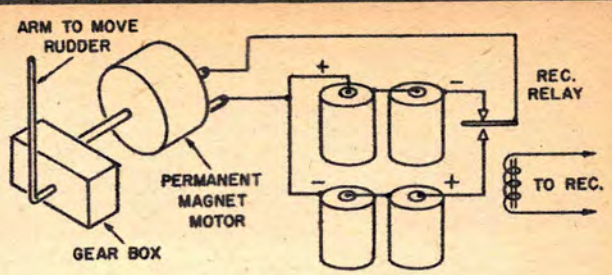


Figure 8

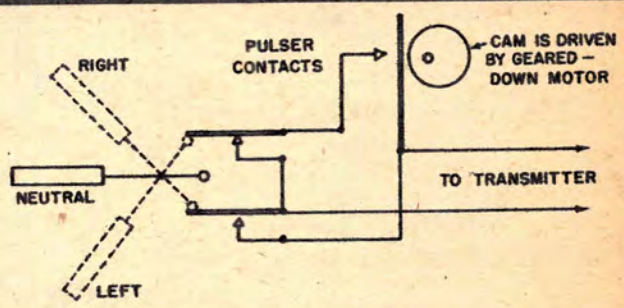


Figure 9

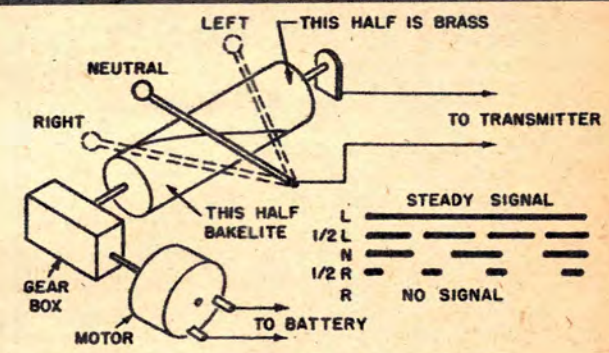


Figure 10

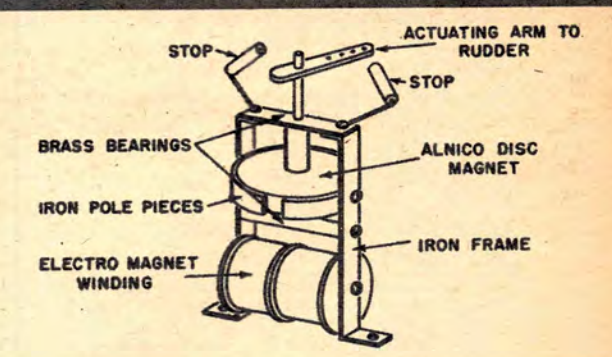


Figure 11

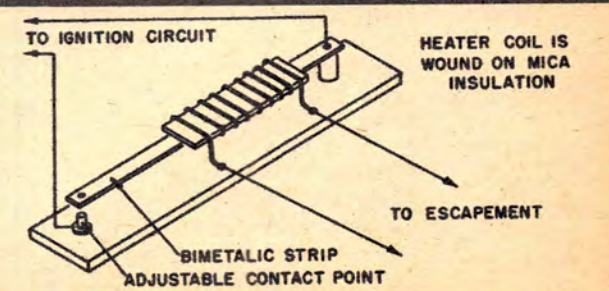
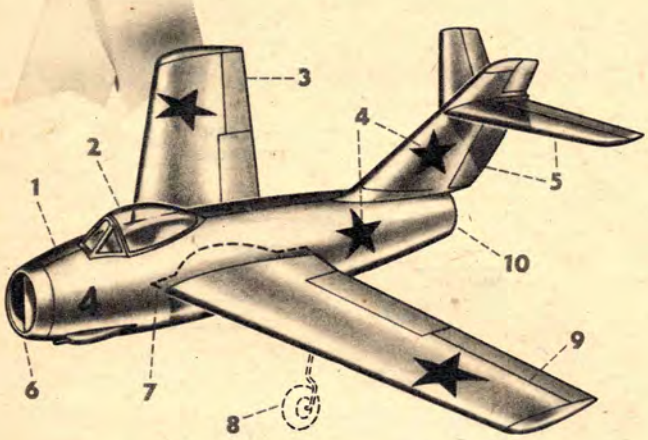
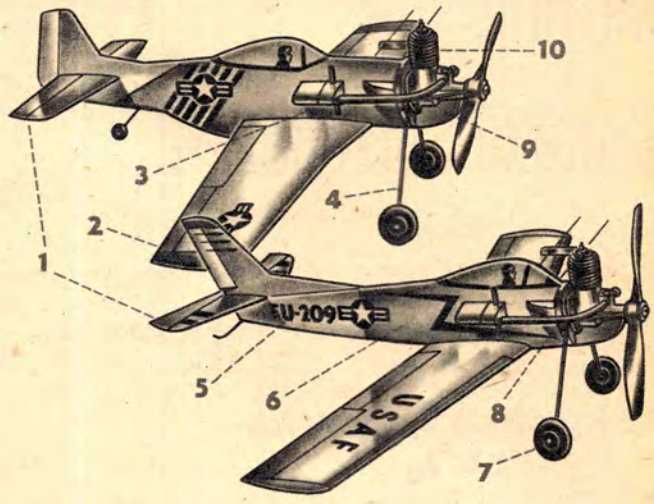


Figure 12





MiG from Philly

Cavacraft models Red fighter

■ Designed for extreme ease of assembly, this "J" series by Cavacraft of Philadelphia works up into a very realistic scale solid. The series now includes the MiG and Sabre.

Construction is entirely of hardwood. The MiG kit contains a very nicely turned fuselage, which is bored out at nose and tail to simulate jet intake and exhaust, and also has slots milled on the sides and top for wings and tail assembly.

The wings and tail surfaces are die-cut, and need only to be sanded down to airfoil shape. To aid in this process, the makers have included a portion of sandpaper and piece of wood to make a sanding stick. They even supply Casco glue to fasten the two together, and to assemble the model. Landing gear wires completely formed, the three wheels furnished.

The builder should apply several coats of sanding sealer or shellac, before coloring is attempted.

The plans are the exploded type, with several detail sketches to aid the builder. They also have an AF photo of real MiG, and photo of finished model. Kit contains a formed plastic bubble canopy and a decal sheet of stars and numerals. The finished size of the MiG is about 7½" span; models of the Cavacraft "J" series sell for 75c.

Detailed construction features are as follows: 1) lathe-turned, grooved hardwood fuselage; 2) formed plastic bubble canopy; 3) die-cut wood wing panels; 4) colored decal insignia; 5) die-cut wood veneer tail group; 6) recessed air intake; 7) die-cut wing tenon facilitates assembly; 8) optional gear parts included; 9) scored control surface outlines; and 10) jet tail orifice drilled.

In addition to these two 75c "solids," Cavacraft offers half-dollar shelf scale kits of the F-51 Mustang, British SE-5, Piper Cub, Ercoupe, Taylorcraft, Navion, Cessna and the Fokker Triplane. The firm's other specialty kits include three race cars—the Bluebird, Cavajet and dirt track racer. Among new Cavacraft items: kit E-1 for snorkel-type U.S.S. Perch sub.

Combat Twins

Scientific offers 2-in-1

■ A new idea in Half-A kits, this product of Scientific Model Airplane Co., Newark, N. J., enables the purchaser to build *two* models—a Sabre and a Mustang —from a single kit. The models are of the simplest construction, and utilize the profile fuselage form of design, with all-balsa wings and tail surfaces. All possible parts are die-cut, and construction should be rapid and certain.

The die-cut fuselages (6) are of solid ¼" thick balsa. Ply firewalls (8) serve to hold the engines and the landing gear wire. The latter is ready-formed (4) and is one of the few parts in the entire kit that is not in duplicate. The makers reason that the builder will probably want to change engines when he changes from one model to the other, and the gear comes off when the engine does. All items that must be fastened in place permanently are in duplicate. The wheels (7) are metal-bushed plastic. Profile fill-in blocks (9) are supplied.

The wingspan of both models is 18" and the wings are made by the same method Scientific has used in other kits; there is a main section (2) of die-cut ⅛" sheet which runs the full 18" span, and trailing edges are added to make up the full chord width. Hardwood inserts are furnished for the bellcrank mounting. Wood screws and washers are included for the bellcrank (3). The tail surfaces (1) are in duplicate, of course, each of the distinctive shape for the plane being modeled.

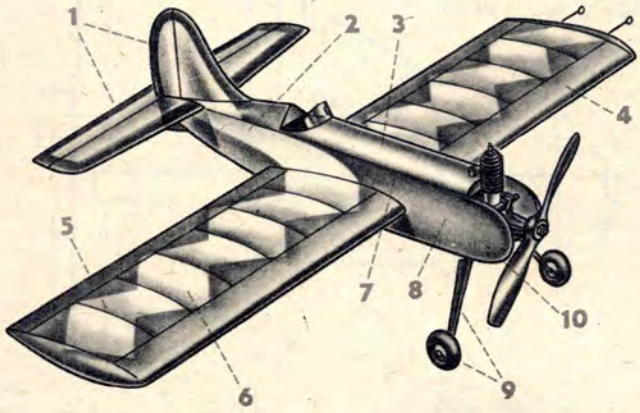
Besides being extra easy to build, these little ships are ideal for the beginner pilot to fly.

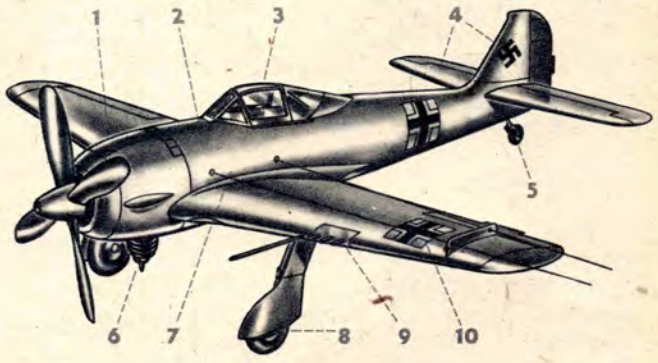
A decal sheet (5) with stars enough for both ships comes with the kit, and the sheet also contains numerals, Air Force wording and decal pilots.

Engines from .039 to .074 may be used (10), but beginners should stick to the sizes below .05. Finished models will weigh about 3½ oz.

At the price of $1.50 for two models, this Scientific kit looks like a cheap way to try out combat flying—if you are "downed in combat" you won't lose much!

RIBBON MODELS





Tennessee Stunter

Empire's Duke is complete

■ The designers of this kit aimed to produce the most complete assembly of materials possible. The box contains *everything* needed to produce a finished model, except the dope. There is a good-sized tube of cement, a completed "Perfect" stunt tank (8), and even a strip of solder to use in fastening the washers onto the axles.

The maker is Empire Model Engineering Co. of Nashville, Tenn. Selling for $3.45 through the usual hobby shop outlets, "The Duke" is a Half-A stunter for the medium sized Half-A engines. You can get real action with the .049's, and even an .045 will give good results. To assure such action, considerable thought went into the design, and the result is a rather short wing with fairly thick airfoil.

The construction is very simple, with the fuselage built up from two balsa sides joined by solid formers. These parts (2) are die-cut, as are all other balsa parts. The die-cut sheets are also printed, to aid the builder in locating the various components.

The preformed landing gear wire (9) is held in a three-part plywood sandwich, which forms the firewall (10) for motor mounting. A shaped fuselage cowl and turtle deck (3), and sheet balsa bottom complete the fuselage. Wheels (9) are plastic.

Tail surfaces (1) are die-cut sheet balsa; here we find another nice little design detail. The cloth hinges for the elevator are in the form of "H" sections, that is, there are two pieces stitched together, forming a very substantial hinge. There are four of these.

Wing construction should be fast, for the leading and trailing edges (4) are fully formed and notched for the ribs (5). The bellcrank (7) (another "Perfect" product—the bellcrank comes with all hardware) is attached to a substantial ply panel. Covering (6) is Silkspan.

The makers prefer low pitch props—5/2 for the .045, and 5.5 or 6/2 for .049 engines. Finished models average about 3½ oz. in weight. This looks like a quickly assembled midget stunter of real ability.

The FW-190 Flies Again

Scale-speed job by Consolidated

■ This accurate reproduction of the German pursuit plane is one of a series of six ½" scale model kits recently introduced by Consolidated of New York. Since the models are all to the same scale, they vary slightly in size; the Focke-Wulf, for example, spans about 17½", while the Hawker Typhoon—another new member of the series—measures almost 18½". Others of this same series, all of which sell for $2.95, are the Mustang, Corsair, Jap Zero, and the Spitfire.

Basis of the ships is the special "Redi-Carved" fuselage. The fuselage (2) is solid balsa which has been hollowed out, and is entirely shaped on the outside. The outer carving includes the wing stub, and the cockpit opening is cut on all the models. The balsa surface is smooth enough so that no further cutting is needed on the fuselage; it may be brought to final shape with sandpaper only.

The fuselage is split horizontally along the center, so the builder can install the plywood firewall, fuel tank, and control horn. All control mechanism (7) is internal, adding to realism and neat appearance of the plane. The plans for the Focke-Wulf show installation of both the Wasp and Cub .039 engines; due to its low height, the Wasp hardly can be seen, but since inverted engine installation is recommended, the Cub and other engines of greater height will not affect the scale look.

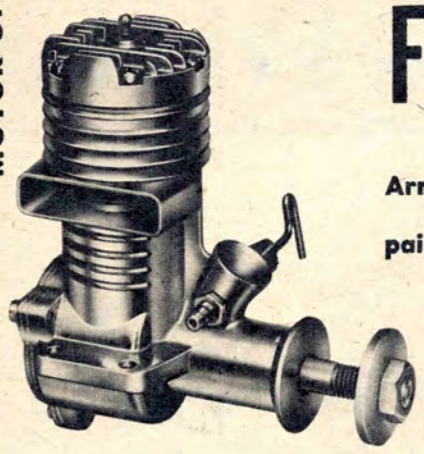
Wings (1) and tail surfaces (4) are shaped in planform to be cut to the correct airfoil. The wing blocks are ½" thick and the tail parts ¼".

The kit has a decal sheet (10) with authentic markings, and the full-sized plans show the many little details (9) which can produce a beauty or scale winner, if faithfully copied. Included are printed plastic canopy parts (3), wooden tail wheel (5) and wire gear and main wheels (8).

The engine range (6) is .039 to .074. With the larger power unit, it is felt that the Focke-Wulf should be a candidate for Half-A scale speed use, due to its very clean lines and streamlined airfoil.

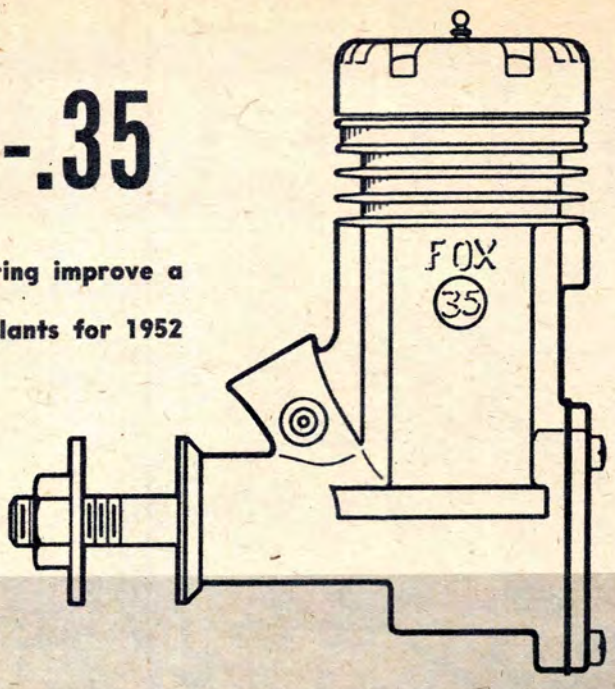
THE MONTH

MOTOR OF



Fox .29-.35

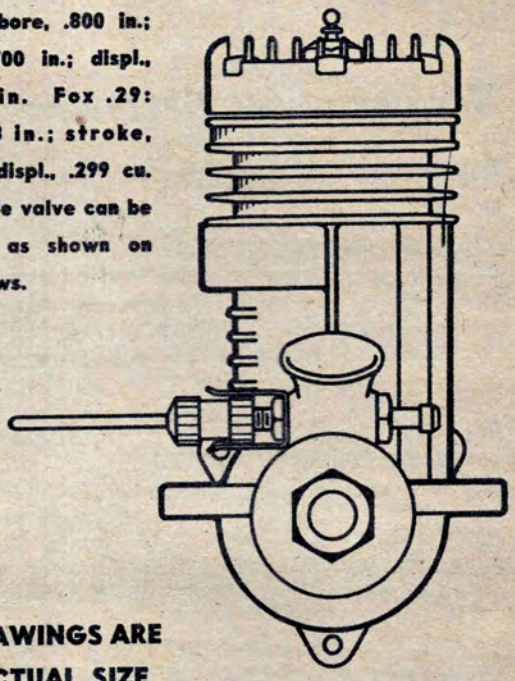
Arnold & Fox Engineering improve a pair of stunt power plants for 1952

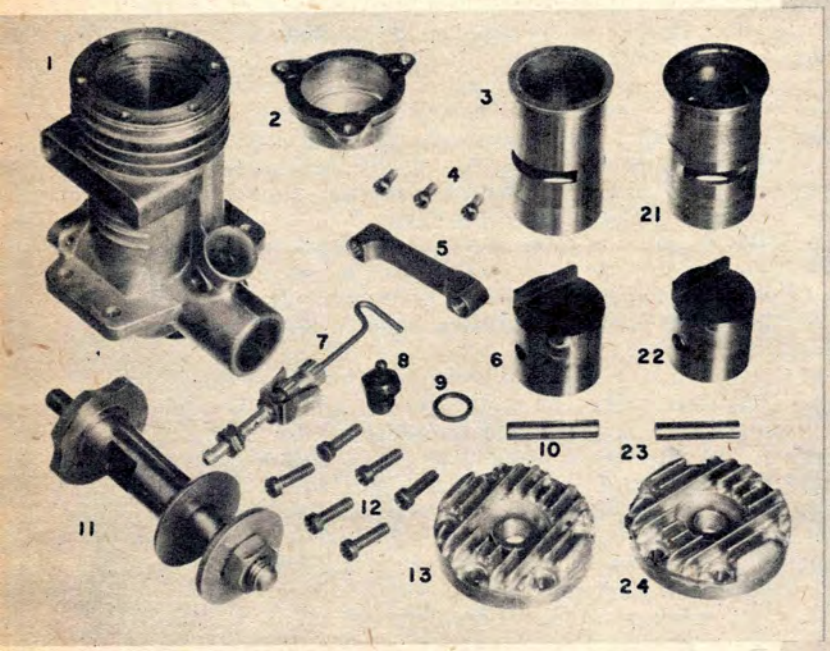


■ All changes made in the famous 1951 Fox engines to produce the '52 models are improvements in an already fine engine. The manufacturer mentions new castings, cylinder head, wider motor mounts, and a shorter exhaust stack for better accessibility to mounting screws. The cylinder head, base, and rear cover plate are all high-pressure die castings with a smooth surface, better appearance and slightly less weight than the old sand castings. More cooling fins are used on the cylinder head and six hold-down screws are used instead of four. Motor mount bolt holes remain unchanged, but the motor mount lugs are slightly wider for more bearing against the mounts.

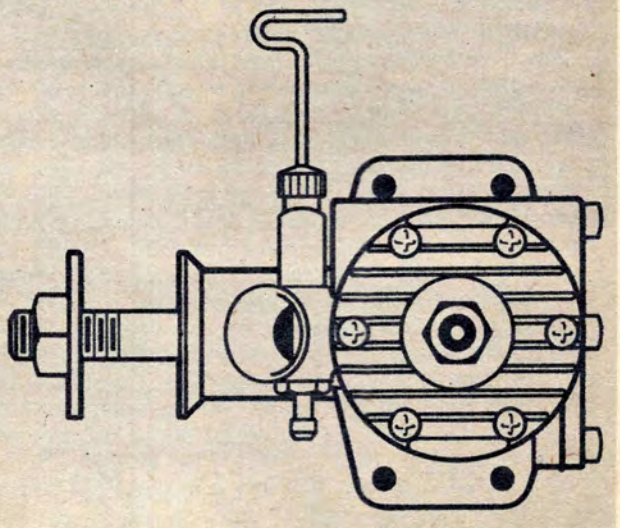
Only the above changes are mentioned by the manufacturer but the "AT" test shows several other improvements. The compression ratio in both the head and base of the engine are slightly higher than the 1951 models. Higher base compression results from the new base casting. The engine test shows higher rpm for both the .29 and .35 models, and an increase in the fuel level test from 15 inches up (*Continued on page* 62)

Fox .35: bore, .800 in.; stroke, .700 in.; displ., .352 cu. in. Fox .29: bore, .738 in.; stroke, .700 in.; displ., .299 cu. in. Needle valve can be switched as shown on three views.





DRAWINGS ARE ACTUAL SIZE



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FREE FLIGHT GAS

Cl. B Junior
Lawrence Miles
Medford, Oregon
Perf. 15:30.9
Engine O & R 29
PROP 10/6 TOP FLITE
Plane Modified Cumulus
Fuel Spitzy

Cl. B Senior
Kenneth DeGioieus
Sacramento, Cal.
Perf. 12:41.8
Engine Torp 29
PROP 12/6 POWER PROP
Plane Sandy Hogan
Fuel Power Mist

Cl. B Open
Jack Smith
Santa Barbara, Cal.
Perf. 16:52.6
Engine O & R 23
PROP 10/6 TOP FLITE
Plane Amazon 400
Fuel O & R No. 2

Row Junior
Bruce Tune
Los Angeles, Cal.
Perf. 18:38.4
Engine Torp .049
PROP 6/3 TOP FLITE
Plane Smarty
Fuel Thimbledrome

Row Open
Elmer Scraggs, U.S.A.F.
Wichita Falls, Texas
Perf. 19:38.6
Engine Torp 29
PROP 10/6 TOP FLITE
Plane Zeek
Fuel X-Cell

Cl. ½A Junior
John F. Watson
Ft. Des Moines, Iowa
Perf. 19:09.2
Engine Torp
PROP 5¼/3 POWER PROP
Plane Half-Hay
Fuel Testor 39

Cl. ½A Senior
Matt Antonioli
San Diego, Cal.
Perf. 21:02.2
Engine Wasp .049
PROP 5¼/4 POWER PROP
Plane Zeek
Fuel Supersonic 1000

Cl. ½A Open
Wally Short
Redland, Cal.
Perf. 25:31
Engine Wasp .049
PROP 6/3 POWER PROP
Plane AWOL
Fuel O & R AA

Cl. C Senior
Bill Lofland
Abilene, Texas
Perf. 19:26.2
Engine Torp 32
PROP 10/6 TOP FLITE
Plane Original
Fuel Power Mist

CONTROL LINE

Precision Acrobatic Junior
Frankie Adams
Newark, Cal.
Perf. 325.66 pts.
Engine Fox 29
PROP 10/6 POWER PROP
Plane All American Sr.
Fuel Power Mist

Precision Acrobatic Open
John Lenderman
Tracy, Cal.
Perf. 364.33 pts.
Engine Fox 35
PROP 10/6 TOP FLITE
Plane Stuka
Fuel O & R No. 4

Combat Junior
Bobby Jones
San Gabriel, Cal,
Perf. 67 pts.
Engine Torp 19
PROP 9/6 TOP FLITE
Plane Bomb
Fuel O & R No. 4

Combat Senior
Tommy Winton
Chickasha, Okla.
Perf. 160 pts.
Engine Fox 35
PROP 9/6 TOP FLITE
Plane All American
Fuel Power Mist

Combat Open
D. N. Mallory
San Bruno, Cal.
Perf. 95 pts.
Engine Torp 32
PROP 10/6 TOP FLITE
Plane Sophomore 29
Fuel Power Mist

Flying Scale Open
Thomas Dean
Corpus Christi, Texas
Engine Dooling
PROP 10/6 POWER PROP
Plane Great Lakes Trainer
Fuel Supersonic 1000

PAA LOAD

Cl. AB Jr.-Sr.
Clinton Merrill
Oildale, Cal.
Perf. 16:54.2
Engine Arden 19
PROP 10/3½ TOP FLITE
Plane Crowbar
Fuel Supersonic 1000

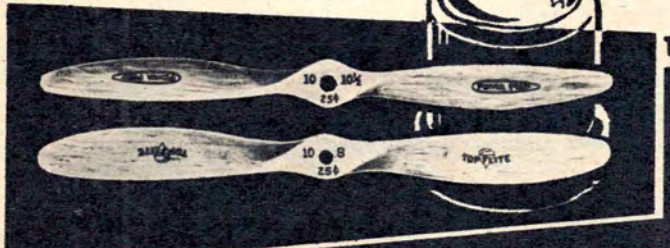
Cl. AB Open
Fran Uyematsu
Montebello, Cal.
Perf. 23:53.4
Engine Torp 19
PROP 9/6 POWER PROP
Plane Modified Cumulus
Fuel Supersonic 1000

PAA ½A

Payload Jr.-Sr.
Paul Crowley
Detroit, Mich.
Perf. 9:15.8
Engine Wasp .049
PROP 6/3 TOP FLITE
Plane PAA-Master
Fuel Nitro X

NAVY ½A CARRIER

Control Line
Mr. & Mrs. Ray Randall
Colma, Cal.
Engine 2-Wasp .049
PROP 2-5¼/4 POW. PROP
Plane Grumman Sky Rocket
Fuel O & R AA



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Dope Can

News, Views, Photos and Comment from Air-Modelers Everywhere

■ A real blow to model aviation was the sudden death of John Bollinger just before the National Contest which he was to direct. His loss to the contest was enormous, naturally, but it was his outstanding contributions to aeromodeling and to youthful aviation enthusiasts on the West Coast for many years that endeared him to thousands.

Early this year he accepted the directorship of the 1952 National Championship Contest. From then until his untimely death he worked unceasingly to lay the groundwork for what may well prove to be the best organized Nationals in the history of model aviation. The success of the meet resulted directly from his untiring efforts.

The loss of John Bollinger was a tremendous blow to model aviation both in Southern California and throughout the country.

John was a lot like another friend of ours who is no longer "among those present." We mean Paul K. Guillow, the late, great friend of the model builder whose death nearly a year ago saddened a host of friends all over the country.

Just like John, Paul was first, last and foremost "for" the air-eager youngster. He was never too busy, too late nor too tired to stop and chat with a youthful modeler. Paul had the energy of a dozen men despite poor health, and his greatest monument is the vast throng of aviation people who got started on their air careers by building model planes from Paul's kits.

And he was never satisfied with a finished product, either. Couldn't the kit be made even more complete, sold for less money, include more details? You know, we started off in modeling by building his 5c (yes, we said five cents) kits of solid models which included two (!) vials of colored enamel, extra balsa wood and real slick plans. We are most pleased to see that the Guillow family carries on in the same tradition and retains the name of the firm's founder.

It is the Bollingers and the Guillows who make model aviation a hobby-sport set apart and above from many other avocations. What adequate words can you find to express your appreciation to such people when they are around or to salute them with when they depart?

Each year the astute American Hobby Federation conducts a nation-wide poll to determine the most popular hobbies among young folks from eight to sixteen years of age. And each year we find that model airplane building and flying has inched up the list. This year model planes are in third place! First is collecting seals and labels; second, collecting autographs and third, aeromodeling. Model railroading slipped to 10th position; stamp collecting went from 1st position to 6th—seems that inflation has set in and stamps cost too much these days. Note that modelplane building is the *top* construction hobby. In other words very little skill is required to cut a label from a box and paste it in a scrapbook; autograph hunters have to be ingenious, true. But to be a modelplane enthusiast you have really got to be handy. So three cheers for our side!

Show is about to Begin. Herkimer Tool and Model Works (they construct the Cubs, chum) have completed a 10-minute sound film for distribution among hobby dealers. Here's a chance to get a swell club program set up some evening soon. Charles Brebeck, Herkimer's head, said the film will be offered to dealers for free exhibition among model clubs, schools, churches, business groups and other civic organizations.

The film highlights various types of flight competition at local, state, national and international engine-powered model flying events. Using such contests as a background, it describes a youngster's first efforts to compete in model meets and then goes on to credit the people respon- (*Continued on page 78*)

(Top) Navy U/C scalers by R. F. Carlin, Sr., Phila. Delta: 20" span, 2 lbs., by L. W. Christensen, Los Angeles. CG now at 35% chord.

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FIRST REALLY MAJOR FUEL IMPROVEMENT IN YEARS!

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Whether you're flying in the Nationals . . . or just for fun . . . get a new thrill, get new performance out of your engine with NEW CHEMINIZED O & R Fuel. You'll *see* it has a slightly reddish tinge (which identifies it) . . . you'll *smell* that it has that hot performance quality . . . you'll *hear* the sweet sound of faster, smoother RPM's than you ever heard before. The favorite fuel of modelers the world over will be yours, too, when you try the O & R Cheminized Fuel that is made specially for *your* engine.

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Wasp .049 DISPLACEMENT

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R/C Primer

(Continued from page 47)

the transmitter control in Fig. 9, the same sort of operation as that obtained from the plane equipment of Fig. 8 might be had; however, you could have only neutral (equal on-off pulsing) or full right and left rudder—there could be no intermediate stops as with the geared-motor drive.

Addition of an arrangement at the transmitter that could give not only equally spaced pulses for neutral, but also pulses varying in any desired ratio of on-to-off signal would allow the rudder to be moved to any desired deflection either side of neutral and held there as required. A simple way to produce such pulses is depicted in Fig. 10.

This device (first put to practical use as a control for German glide bombs during the last war—they called the controller a *"Knupple"*) consists of a motor-driven drum that is half metal and half insulation. Driven at 200-300 rpm by a geared-down motor, it can easily be seen that with the control lever (which is actually one side of the transmitter-operating circuit) in the central position, the pulses and spaces will be equal, and we have neutral rudder. Move the lever half-left and the pulses would lengthen as shown by the bar lines in Fig. 10. Full left lever position would be a steady signal and you would have full left rudder; full right would be no signal and full right rudder.

The same transmitter control would work with the rudder motor drive of Fig. 8, but couldn't be called real proportional control, since it would not be self-centering; various degrees of movement of the control lever either side of center would simply produce different speeds of rudder motor operation. Centering the control lever would hold the rudder in any desired position. The

Radio Control News Flash

FIRST PLACE WINNER of Sioux City Iowa Plymouth dealers' contest July 27, 1952, is O. V. Tyler of 1102 South Saddle Creek Rd. Omaha, Neb., won first place by 100 point margin. The E-Z Automatic Radio Control Switch controlled the plane swell in winds up to 20 miles per hour. A.M.A. Contest Director said the performance was excellent.

Pat. Pend.

4⅜"L x 1½"D x 3"W

FEATURING:

- Can be used with transmitter
- No sequence to remember
- Successive turns at your command
- Turn control knob right—you will get right rudder
- Turn control knob left—you will get left rudder
- No electric motors, gears or springs needed
- No changes to make on the escapement
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- Nothing to get out of adjustment
- Entire unit fits in the palm of your hand

MODEL 102—for 2 arm self-neutralizing escapements
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airplane rudder-operating equipment could be modified to give a closer approach to proportional operation, but the added complications are too detailed to describe here, and the magnet-operated rudder system is much simpler and more practical for a first try by the novice at radio control.

Many experimenters with "proportional" are getting good results from a type of rudder moving mechanism called simply an "actuator." This was worked out by George Trammell, one of the pioneers in simple model plane proportional control, and has been built in many sizes and forms. One style shown in Fig. 11 is essentially an electric motor without a commutator, which can only turn about 90 deg. each side of center, or neutral. It has the advantage that power is very good, while current required is quite low.

It may seem that you are getting something for nothing in proportional control, since you can have right or left rudder in any desired degree on a single conventional radio channel. There is a fly in the ointment, though, and it's only fair to warn the uninitiated of it at the outset. As we have seen, with either the geared-motor or the magnet style of rudder drive, steady-signal gives one extreme of rudder position, while no-signal gives the opposite extreme. What happens if your transmitter—or receiver—goes dead during a flight? You get full rudder and can't do a thing about it!

Hard-over rudder on most powered planes means impending trouble, to say the least. However, you can set things up so that a failure is not necessarily fatal. Since the airplane radio equipment is probably more apt to fail than the relatively heavy and rugged transmitting equipment, it is wise to connect your proportional control circuits so that a receiver failure (which in most cases means that the sensitive relay assumes the non-operated position)

(*Continued on page* 58)

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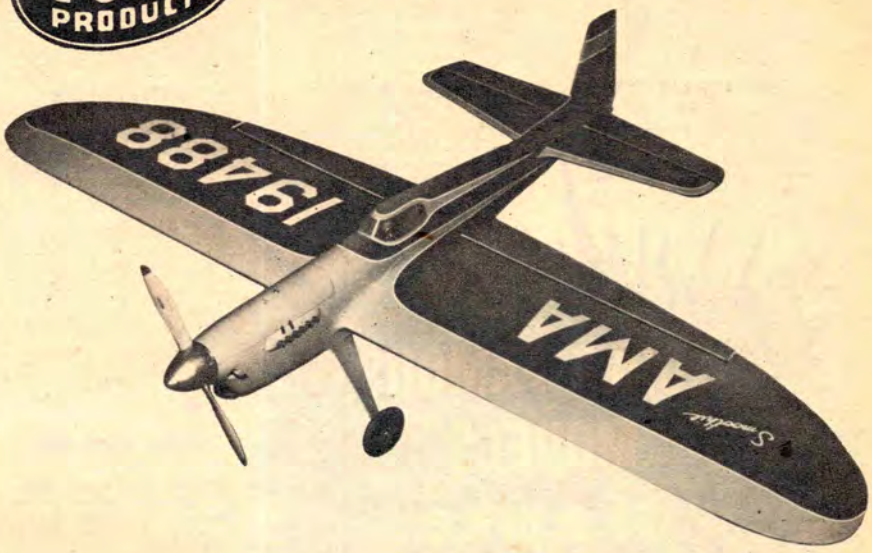

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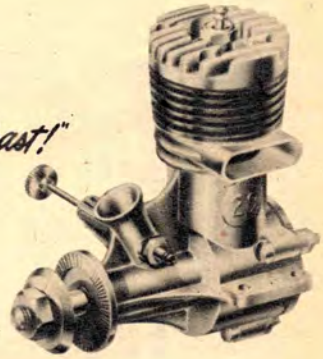

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■ The F.A.I. World Record U-control Record Trials held in San Diego proved to be quite a task. To begin with one must familiarize himself with a completely new set of rules. Most of our regular models will meet these specifications. The only place where a model might be doubtful is jet, where a maximum weight of 1000 grams is allowed. This is approximately 35¼ ounces.

Most of the differences lie in the officials and the paper work which must be handled. In the first place there must be a contest director or one who handles all the details and sees that the rules are observed; one must have a chief timekeeper who uses a watch which has previously been calibrated by the Bureau of Standards; only a few are available to us. These are the Longine Chronometer; also on each flight there must be a first assistant timekeeper and a second assistant timekeeper. To further officiate an observer must be on hand to estimate the height of each lap, since models are not allowed to fly below the horizontal of the pylon.

The line lengths are measured in the metric system as are all other weights and measures.

Line diameters and line lengths were much different than ours. There is no minimum diameter required, so we just stipulated a 20G test and let the fellows use what they desired. In most cases they played it safe and used lines larger than needed. Since the ships had to fly one whole kilometer, quite a number of laps had to be flown.

The minimum line lengths and laps for the various classes are as follows: Class I, 11 meters, 37 cm. or approxi-

and tail. With Torpedo .29 did 3:40 to 4 min. ROG.

mately 37.3 feet and 14 laps to the kilometer; Class II, 13 meters, 27 cm. or approximately 43.5 feet and 12 laps; Class III, 15 meters, 92 cm. or approximately 10 laps. Or you can use the lines Merl Hoyt used of 19 meters, 90 cm., or approximately 65 feet and 8 circuits. This set-up allows the models to fly faster since the line drag is reduced; one thing to be sure to do, though, is to keep it safe.

One big drawback as far as contestants in this country are concerned is the lack of maximum displacement engines for one of the classes. F.A.I. classes are set up much different than ours and based on the metric system; consequently our engine classes are at a disadvantage. Class I goes up to 2.5 cubic centimeters or approximately .152 cu. in.; Class II, 2.5 to 5.0 c.c. or .152 to .305 cu in.; Class III from 5.0 to 10.0 c.c. or .305 to .61 cu. in. As can be readily seen our Class I engines are few and really far from the limit. The only engine which might fall on top is the Thimble Drome, but the fellows must have overlooked it.

Class II would take in the Torp .19 and .29, Mac .29 and Dooling .29, as well as the two Forsters. Some consideration should probably be given these Forsters. It could then be said that in Class II we are pretty well stocked. Class III has pretty much the same as II.

In jet, the Red Head is all that a guy can use, but again it is all he can handle too, being an extremely well designed and constructed piece of machinery leaving a trail of records and performances (*Continued on page 68*)

Highly successful control line speed delta design by Dr. R. G. Lambert. Noted for clean take-offs and in-the-groove flights.

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the Brand New... SCIENTIFIC bel-air

"½A" U-CONTROL MODEL FOR SMALL BORE ENGINES

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SPAN 18" LENGTH 16"

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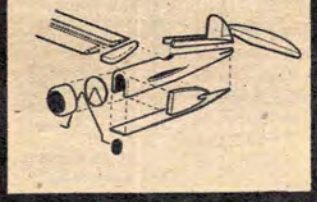
Super Prefabbed for Easy Assembly



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(Continued from page 55)

would result in a turn in the "safest" direction for your particular airplane. You can also set up your rudder stops so that rudder movement (in the direction that would result, should the receiver fail) is held within safe limits.

It is possible—and advisable too, though few flyers do it—to fit cut-off switches or reversing switches to the rudder actuating arm so that if the receiver fails, the rudder is made to swing automatically and slowly from side to side, or is made simply to take up a safe near-neutral position. If your receiver is of a type that gives a non-operated sensitive relay with *either* a receiver failure or no-signal from the transmitter (Rockwood and Citizen-Ship receivers are of this type) you can protect yourself against both transmitter and receiver breakdown—also against inadvertent flying out of range.

(To be concluded.)

R/C Roundup

(Continued from page 17)

$2.95, and is the same one this concern will furnish with their new printed circuit 27¼ transmitter. They also have aluminum antenna sections about 25" long, that have tapered ends so you can use as many as you wish; price is 45c each.

Vernon C. MacNabb Co. Indianapolis, Ind., will market the same bellcrank and rudder horn that are found in the deBolt "Live Wire" model kit. The combination has been found to allow easy adjustment of rudder movement, and prevents the rudder from driving the escapment back in violent maneuvers.

Since we have mentioned a single hard-tube receiver earlier in this column, we feel some readers may be interested to know that they can purchase one of the same general type and operating characteristics. This is the E.C.C. 951, sold by American Telasco, Ltd., Huntington, N. Y.

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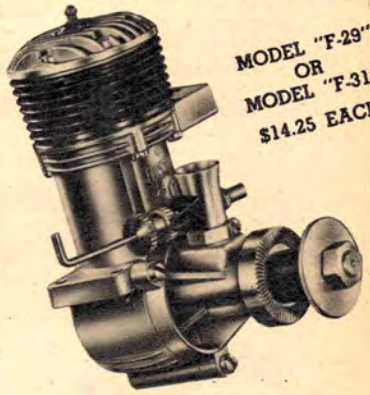

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It was described and pictured in our article on R/C equipment, page 35 of the May '52 issue. Tests made since then have shown that the receiver has a no-signal plate current of about 2.8 ma. When a strong signal comes in this drops to about .6 ma. This change is sufficient to give very reliable operation of the E.C.C. relay. The set takes 1.5 v. at 100 ma. for the filament, and plate battery voltage should be 67 v. It weighs 2¼ oz., and sells for $18.95 complete with 3Q4 tube. Tube is cheap, rugged, and should give many hundred hours of life before requiring replacement, one of the greatest features of this type of receiver.

—HOWARD G. MCENTEE

Perky Trainer

(*Continued from page 36*)

still flat on the drawing. Re-cement the leading edges again at the dihedral breaks. When dry add the top spar. This will serve as a dihedral brace. The tips are now carved and cemented in place. Sand the entire wing making sure that the leading edge and the trailing edge meet the ribs evenly or a poor covering job will result.

The stabilizer is made in the same manner as the wing except that there is no dihedral and only a top spar is used. The two center ribs are spaced apart the thickness of the rudder so that the rudder can be sandwiched into position. The rudder base is ⅛" sheet balsa; note that the grain runs perpendicular. Build the rudder directly over the plan and do not remove until the cement is thoroughly dry, or warping may occur. Sand the rudder smooth and re-cement any joints that may have been weakened.

Cover the fuselage first using light Sky Sail tissue. When covered, wet the tissue with water and set aside to dry. Avoid using rough handling while the tissue is wet. The wings are covered in six pieces to insure a perfect covering job. Water is used here to tighten the tissue also. Cover the stabilizer top in two sections. The bottom can be covered in one. Next the rudder is to be

R/C NEWS

27.255 VS. 465 CITIZEN-SHIP for R/C Flying.

by
Vern C. MacNabb

They are both good and both needed, as RC Flying gets more and more popular. They don't interfere and two modelers can fly simultaneously.

We believe we have an edge in our 465 **CITIZEN-SHIP** Radio Control. The following advantages exist over and above any 27.255 Receiver we have seen or tested including our own—we will be out with it soon.

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We want to explain No. 7. In all 27.255 receivers to date, the plate current DECREASES to operate the relay and escapement. If anything fails in the ship, a connection, loose battery, tube failure, etc., the ship is locked into a turn and will spiral in a crash! We know!!

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Citizen-Ship Test Meter	**19.95**
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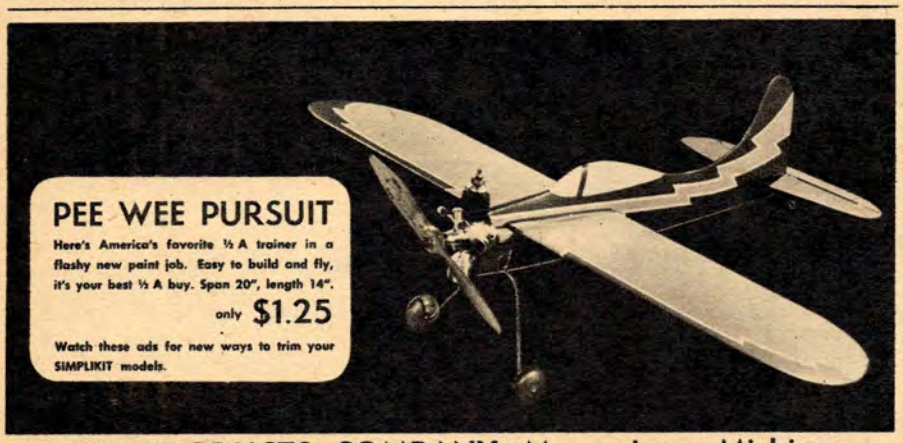

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covered. When covering the rudder do not water or dope this surface as it is covered on one side only and due to the fact that it is thin, warping would occur. Mix up some clear dope with 50% thinner and add about 12 drops of castor oil to an ounce of solution. This is done to prevent any warping of the surfaces. One coat should be sufficient for the wing and the stabilizer. The fuselage can be given several coats for this will have to take the strain of the tightly wound motor.

Make up the motor with no slack between the dowel pin and the loop in the prop shaft. Fourteen strands of T-56 will be ample power for this model. Spread rubber lubricant over the rubber motor and work in well to keep the strands from cutting each other. Glide the model with the wing in the approximate position shown. If the model stalls, move the wing back. Wind the motor to one full row of knots and hand launch the model into the wind. If the model stalls under power add a little downthrust. This is done by inserting a sliver of wood between the top of the nose plug and fuselage, pushing the shaft downwards. Now the model may want to fly to the left (looking from the rear), so add another slab to the right side of the plug. Add these small pieces until the model circles to the right and then add "turn" with the rudder for a glide to the left. While adding these pieces tack-cement 'em in place, for the vibration may loosen them in flight.

By adding off-set to the power and tightening up on the left circle, additional downthrust may be required to keep the model from looping. Gradually add turns until the model is really getting high by stretching the motor five to six times its normal length and then starting winding and slowly walking toward the model. Most winds can be stored in this way. There should be some "give" while the rubber is being wound. Stay out and wind approximately 50% of the turns and then wind and walk in. This all must be done as quickly as possible, or rubber will become fatigued.

CAP Cadet

(*Continued from page* 16)

watch. For training that GOC lacks, CAP Cadet courses can occupy one for years. So

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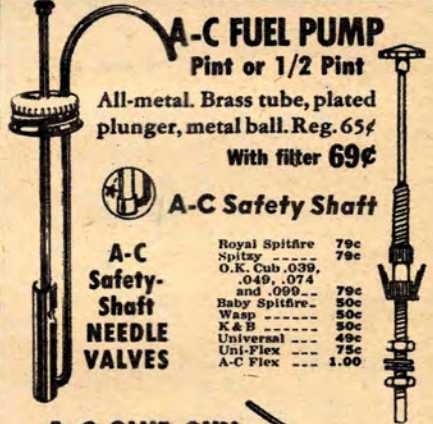

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when units of CAPC work into the GOC, both the job and the means of keeping interest are put together.

Probably many more CAPC units will be formed specially for this purpose. Air Explorer Scouts also can serve. No official word on this from CAP Headquarters whose people have been busy arranging the international exchange for 110 Cadets; but it's a task that could employ 110,000.

However, local units need not wait for Headquarters. Months ago, especially in Tennessee and California, CAP Cadets started working into GOC by direct agreements with local Civil Defense and Air Defense, long before Hq. ever heard of it.

Honorary memberships in CAPC were presented by the Pennsylvania Wing to Betty Bennett and Al Bennett, Jr., who legally soloed at 11 and 13 respectively. Though U.S. solos require a minimum age of 18, these youngsters were taken by their dad Al Bennett, Taylorcraft vice-president, to countries where no such rule applies. Betty went to Cuba and Al, Jr., previously soloed in Mexico.

Cadet age limit may be raised to 21. As it is, those who reach 18 are supposed to go out of the program unless they join the senior CAP, which most fail to do.

Idea is that if they can stay Cadets longer, they can get leadership experience, continue CAPC courses which few finish, and work toward Air Force service.

A Director of Cadets has been appointed at National Headquarters. Maj. Ray L. Urton, bomber pilot over Europe and the Pacific in World War II, has been shifted from the post of Adjutant. For years after the war, he was a regional AF Liaison Officer with the Air Explorer Scouts. He went to the Scouts' national executive school.

This appointment makes a third division under the Deputy Chief of Staff, Operations & Training, Col. Wm. Trachsel.

—COL. KENDALL K. HOYT,
Founder of the CAP Cadet Program

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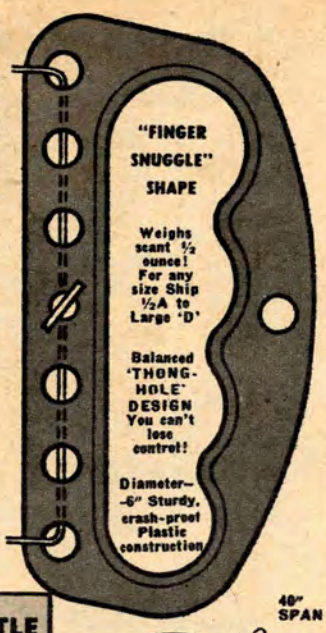
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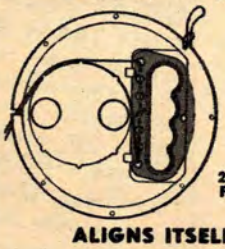

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Fox Engines

(*Continued from page* 50)

to 18 inches. This indicates that they should deliver even more constant power during flights. The engine is still extremely easy to start. The piston is relieved a slight amount below the wrist pin so that bearing against the cylinder sleeve is only on the upper half of the piston. This results in a faster break-in and less oil drag when the engine is operating.

The engine test was started with a thorough break-in. The .35 model was fitted very close and took 1½ hours to limber up completely; the .29 took about 20 minutes. Both engines were run for two hours before starting the test. The .29 model was difficult to start the first few times, but the hole in the needle valve was found to be pointing straight back rather than toward the shaft. Resetting the needle valve corrected the difficulty and both engines displayed the same starting and running characteristics.

They were easy to start and ran consistently with a broad needle valve adjustment at all speeds. They were also started easily when very hot by dousing the engine in the exhaust and intake with fuel, and then quickly turning the propeller to seal off the exhaust and port, starting to flip quickly before the fuel evaporated. The 1952 engines show much less tendency to overheat than the '51 models. Even the .35, which was quite tight, did not overheat and slow down during the break-in period.

Past performance has shown the Fox engines to be outstanding in stunt models. The 1952 models should further this reputation with the improved performance and appearance. All the features that make them good stunt engines also make the Fox .29 and .35 excellent sport, free flight, and scale powerplants. They are not intended for speed but show good high-speed performance.

Glow plug engines first appeared about five years ago. Some showed great bursts of power but they all sputtered and popped more than they ran. Recently developed glow plug engines such as the Fox, used with new fuels and glow plugs, deliver performance that is a credit to the model industry by comparison with those first powerplants.

Engine Data—Fox .35

Performance. Weight: 5.9 oz. Propellers: 10/8 wide blade wood, 8,500 rpm; 10/6 wide blade wood, 11,000 rpm; 9/6 wide blade wood, 12,500 rpm; 9/6 narrow blade wood, 13,400 rpm; 8/6 wide blade wood, 16,500 rpm. Fuel: not critical. Fuel level test: 18" at 11,000 rpm.

Design Data. Displacement: .352 cu. in. Class: C. Stroke: .700 in. Bore: .800 in. Stroke bore ratio: .875. Compression ratio head: 6.4. Compression ratio base: 1.52. Port area intake: .055 sq. in. Bypass: .068 sq. in. Exhaust: .110 sq. in. Ignition: Ohlsson Racing Plug.

Construction Features. Bearings: crankshaft, bronze; crank pin, aluminum: wrist pin, aluminum. All external parts die cast.

Engine Data—Fox .29

Performance. Weight: 6.22 oz. Propellers: 10/6 wide blade wood, 9,800 rpm; 9/7 wide blade wood, 10,500 rpm; 9/6 narrow blade wood, 12,000 rpm; 8/8 narrow blade wood, 13,000 rpm; 7/9 narrow blade wood, 14,500 rpm; 8/6 wide blade wood, 15,000 rpm. Fuel: not critical. Fuel level test: 18" at 10,500 rpm.

Design Data. Displacement: .299 cu. in. Class: B. Stroke: .700 in. Bore: .738 in. Stroke bore ratio: .95. Compression ratio head: 6.6. Compression ratio base: 1.43. Port area intake: .055 sq. in. Bypass: .068 sq. in. Exhaust: .096 sq. in.

Construction Features. Piston, liner

(*Continued on page* 64)

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This sample spread from the 1490-to-1952 "Air Progress" section is indicative of the more than 875 drawings by Douglas Rolfe which make up this never-before-equalled aircraft collection.

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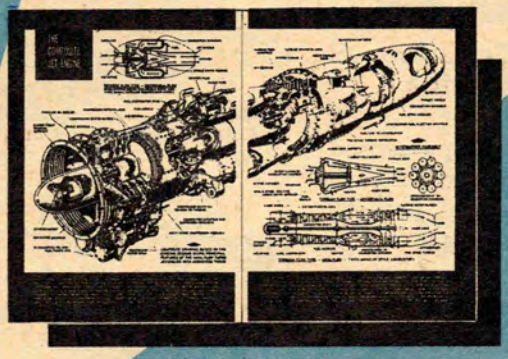

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Here is a new, modern development in prop making that combines the strength, safety of wood and a plastic coated surface to give you a prop that is thinner and stronger . . . designed with a perfect Clark-Y air foil section to reduce torque and give your engine more thrust per R.P.M. For consistent High Quality . . . Use Tornado Props

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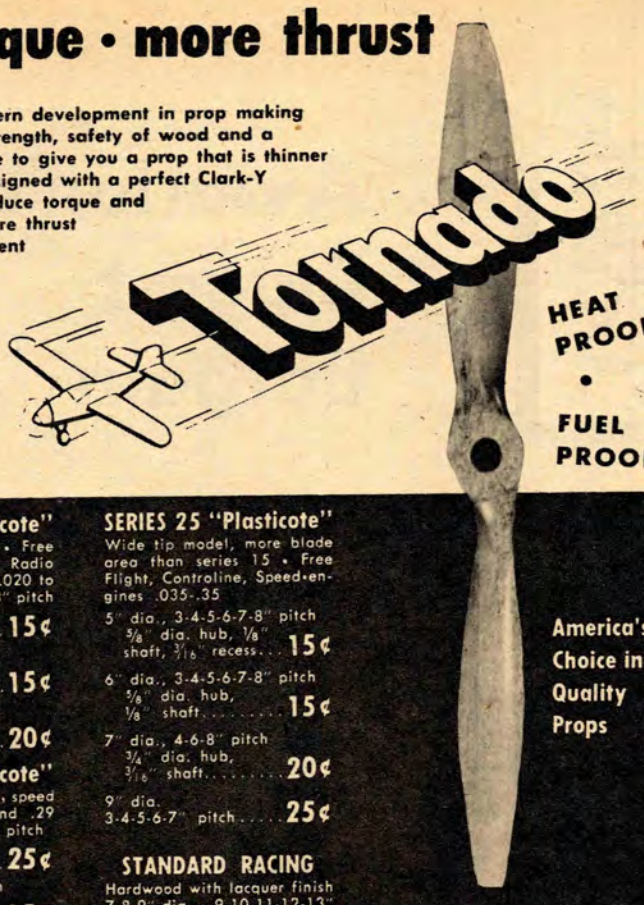

HEAT PROOF • FUEL PROOF

SERIES 15 "Plasticote"
Narrow blade model • Free Flight • Pay Load • Radio Control • For engines .020 to .074 displ. 5" dia. 2-3" pitch
½" dia. hub, .140 shaft hole.... 15¢
5" dia., 2-3" pitch ⅝" dia. hub, ⅛" shaft, 3/16" recess.. 15¢
7" dia., 2-3-4" pitch ⅝" dia. hub, ⅛" shaft, 3/16" recess.. 20¢

SERIES 35 "Plasticote"
Medium width blade, speed model engines .19 and .29 displ. 6" dia., 9-10" pitch
¾" dia. hub, 3/16" shaft hole.... 25¢
7" dia., 8-9-10" pitch ¾" dia. hub, ¼" shaft hole..... 25¢

SERIES 25 "Plasticote"
Wide tip model, more blade area than series 15 • Free Flight, Controline, Speed engines .035-.35
5" dia., 3-4-5-6-7-8" pitch ⅝" dia. hub, ⅛" shaft, 3/16" recess... 15¢
6" dia., 3-4-5-6-7-8" pitch ⅝" dia. hub, ⅛" shaft..... 15¢
7" dia., 4-6-8" pitch ¾" dia. hub, 3/16" shaft..... 20¢
9" dia. 3-4-5-6-7" pitch..... 25¢

STANDARD RACING
Hardwood with lacquer finish 7-8-9" dia. • 9-10-11-12-13" pitch • Engines .29-.61 50¢

America's Choice in Quality Props

GRISH BROTHERS • ST. JOHN 1, INDIANA

(*Continued from page* 62)
and wrist pin are only parts that differ from .35 engine.

Parts Illustrated

Fox .35. 1. Crankcase: die-cast aluminum, 1.97 oz. 2. Rear cover plate: die-cast aluminum, .22 oz. 3. Cylinder liner: steel-ground and honed, .800" bore x 1½" long, .62 oz. 4. Rear cover screws: steel, 4-40 thread, .05 oz. 5. Connecting rod: aluminum, 1¼" long, .09 oz. 6. Piston: cast iron, .800" dia. x 11/16" long, .36 oz. 7. Needle valve assembly: brass and steel, 1/16" needle, .20 oz. 8. Glow plug: steel, 1/4-32 thread, .08 oz. 9. Glow plug washer: copper, .035" thick. 10. Wrist pin: steel-brass pads, .156" dia. x 25/32" long, .07 oz. 11. Crankshaft: steel—hardened and ground, .436" shaft, .186" crank pin, 1.18 oz. Drive washer: steel-hardened, ⅞" dia., .22 oz. Front washer: steel, ⅞" dia., .20 oz. Propeller nut: steel, 1/4-28 thread, .11 oz. 12. Cylinder head screws: steel, 4-40 thread, .12 oz. 13. Cylinder head: die-cast aluminum, 1 5/16" dia., .40 oz.

Fox .29 Special Parts. 21. Cylinder liner: steel, .738" bore, .93 oz. 22. Piston: cast iron, .738" dia. x 11/16" long, .36 oz. 23. Wrist pin: steel-brass pads, .156" dia. x 23/32" long, .07 oz. 24. Cylinder head: die-cast aluminum, interchangeable, .42 oz.

Jet Ace

(*Continued from page* 21)

hut, shoot the pilot's information file from his hands, kill his crew chief and burn his brand-new aircraft with the just-painted name of his girl on the side. For, while the destruction of the enemy fighter pilot in the air is winning the battle, destruction of his aggressive will to fight by constant pressure is the attainment of air superiority and the winning of the decisive phase of the war.

There Is a **BIG SURPRISE** In Store When You See the New **CAMERON .19**

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The Cameron .19 Engine will surprise you with its extreme smallness and lightness. Yet it features extra large bearings, heavy duty crankshaft, exceptionally large and strong motor mounts, great over-all ruggedness, etc.

MODEL "L" Lapped Piston Type

MODEL "R" Piston Ring Type

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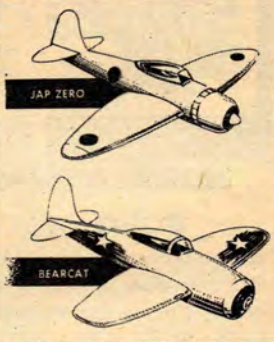

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- **Spitfire**

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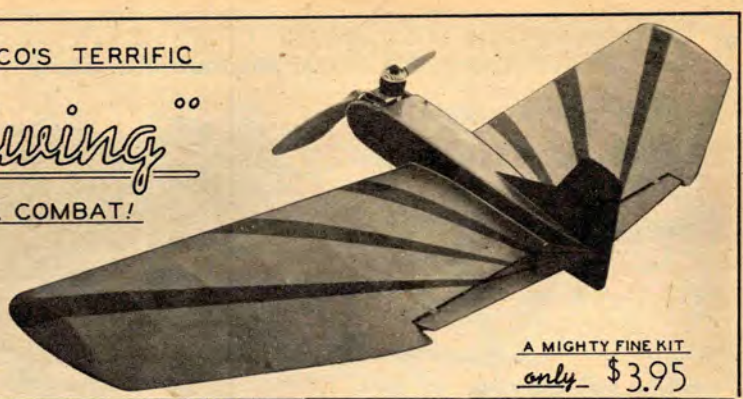

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Specifications:
Wing Span: 36"
Wing Area: 250 Sq. in.
Design weight: 14 oz.
Power: .19 to .29 engines
Fully stuntable!

Complete kit:
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- Full Size detailed plans!
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- Jig built wing for simplicity and accuracy!

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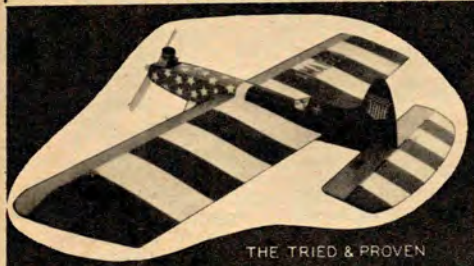

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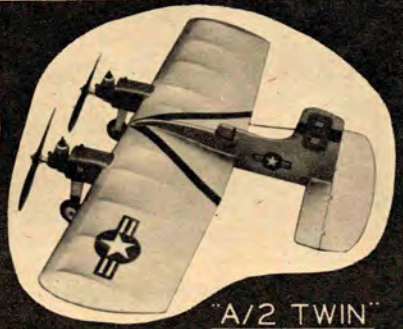

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All of these fine dmeco kits are pre-fabbed from the world's best materials to the most exacting tolerances. Complete with GIANT full size plans, instructions, covering materials and all special hardware to make a truly fine model. Fully unconditionally guaranteed against defects in materials and workmanship.

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"SPEEDSTER"

HERE IS REAL FUN WITH 1/2A TEAM RACING!

$2.50

PRODUCTS OF THE
DE BOLT MODEL ENGINEERING CO.
WILLIAMSVILLE, N.Y.

It was an axiom in Korea that "courage is the full exploitation of skill." The tide of an air battle has often been changed by the sudden, aggressive tactics which confuse the enemy.

Audacity is a refinement of aggressiveness—especially when applied to seemingly overwhelming odds. The audacious use of fundamental principles is the key to the success of the F-86 in Korea against an enemy who holds all the trump cards of superiority in altitude, numbers and intelligence of our movements (due to our operation within his radar range).

I recall an outstanding example of this principle in World War II when two American pilots attacked a formation of 25 Me-109s.

In this case our pilots attained complete surprise and destroyed two 109s on the first bounce. The two attacking 25 was such sheer audacity that, in the conviction that they must be outnumbered, the enemy formation broke for the deck and Tail-End Charlie bailed out in panic, bringing the total American claims to three and a formation of 25 enemy aircraft never reached our bombers.

Air Discipline cannot be overemphasized. When we talk of aggressiveness we do not mean that every pilot should personally become a lone wolf and go off on the prowl seeking glory. The chances of survival are slim for such a performer. Teamwork and close coordination are essential and it is no easy task to instill this in the mind of a fighter pilot who flies alone and must think for himself, using his personal initiative many times.

There has been a great deal of discussion in both World War II and in the Korean war regarding the tactics of fighter escort. The bomber pilot generally feels he is getting the best protection from the fighters he can *see* in close escort.

If we apply one of the simple principles of air warfare (aggressiveness again), it becomes clear that this is not

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MOST ECONOMICAL! Will not wear out. Constant high resale value. Savings on propellers and fuel alone pay the difference in cost between Dyna-Jet and cheaper engines.

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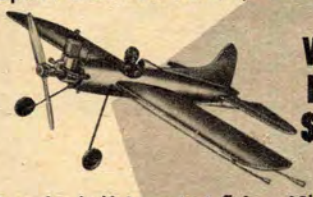

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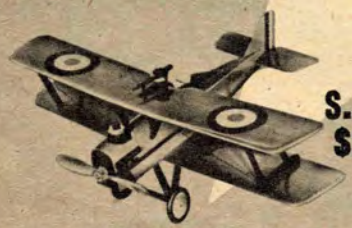

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so. The speed of fighter aircraft is such that they can approach from any direction and attack the bombers before the close escort fighters can take action. The only hope the bomber has is for friendly fighters to engage the enemy before he begins the attack.

To be able to do this, the friendly fighters must know from where the enemy is coming.

Under normal conditions, the friendly fighters cannot know from where the enemy is coming when he is in the middle of enemy territory. His only solution (and the bomber pilot's only solution) is for the fighter to apply the principle of aggressiveness and range far afield, seeking the enemy wherever he may be, and attain air superiority.

Until other means are developed, this is the only means of bomber protection. In other words, the bomber force determines the field of aerial battle and the fighter force must be in the same piece of sky, but for it to remain in "close" escort gives the initiative to the enemy and leads to failure of the escort's objective.

In Korea, I used to like to refer to the pilots in my group as "Old Pros," and we had them. Glenn T. Eagleston, for instance, as deputy commander for the first P-51 group in Europe and an ace credited with 23 Germans, again applied the principles of air fighting to his command of the famous 334th Fighter Squadron of the 4th Fighter Group in Korea, and again distinguished himself as a brilliant tactical commander.

Then, Jim Jabara was not new to the game, having already won the title of ace in World War II. Don Nance, commander of the 335th Fighter Squadron was a veteran of the North African and Middle East campaigns. There were also many other battle-scarred veterans to make the 4th Group the most experienced group of air fighters in the world.

That application of the Three-A's does not necessarily need combat ex-

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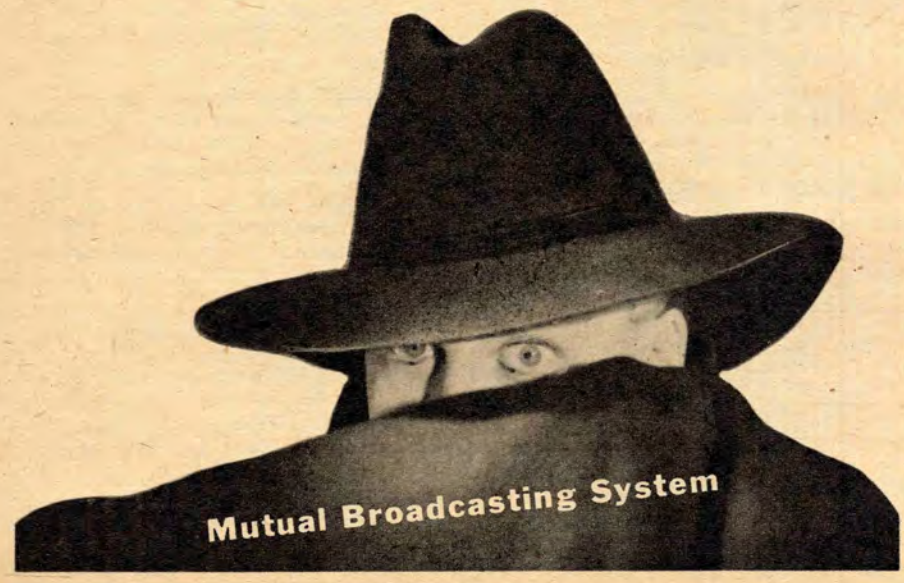

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perience is shown by the fact that Bruce Hinton, whose valuable service in training during World War II prevented him from having the opportunity to prove himself until Korea, showed all of us the way to do it when he destroyed the first MiG. His skill, aggressiveness and artful leadership of the 336th Fighter Squadron clearly established him as one of the outstanding combat leaders of all time.

Jim Jabara may not have been the best fighter pilot in the 4th Group, but he was certainly one of the best. He maintained a high level of air discipline and was one of the better gunmen. These factors alone would have made him a high scorer. But what made him the first jet ace was that he wanted to shoot down MiGs more than anyone else. Jim was a Triple-A Threat air fighter who spelled AGGRESSIVENESS in capital letters.

"FW 198"

(*Continued from page 27*)

informed at least, all Dutch airplanes were known as 'Fokkers.' It is not a far cry from 'Fokker' to 'Focke-Wulf'; indeed, during the early war years, the products of the two companies were frequently confused. Thus, it appears that the de Schelde S.21 appeared in certain official archives as a 'Fokker,' and a certain British aviation journal, a member of whose staff had a glimpse at the official file, published drawings of the airplane. This journal assumed that the manufacturer was not Fokker but Focke-Wulf (the Fokker concern having freely revealed all its projects), but how the airplane later acquired the type number '198' is anybody's guess.

"Let us hope that these facts will at last lay the 'ghost of the Focke-Wulf FW 198'."

But, alas, Mr. Green's communication *did not* stop the flow of letters, com-

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★ BEAUTIFULLY DESIGNED
"They look like real airplanes"

★ DESIGNED BY "HI" JOHNSON
Backed by 20 years of experience in designing contest winning models. Co-designer of the GO DEVIL. Designer of the CHIEF, WARRIOR, SQUAW, COMANCHE, BRAVE, SIOUX, and many others.

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All parts are die-cut, formed and fit together with ease.

★ ILLUSTRATED PLANS
Step-by-step drawings make KENHI Models easy to build for the novice or experienced modeler.

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Aerodynamically correct for stable flight and ease of maneuvering for the novice or experienced modeler.

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Easy-to-Build
Easy-to-Fly

NOTE: The KENHI "WILDCAT" altbough handicapped 40 points, because it wasn't painted, and on its third flight, won the first contest it was ever entered in. The 1952 National Orange Show Contest, San Bernardino, Calif. "Wildcat" flown by Frank Dawson, Van Nuys, Calif.

SPECIFICATIONS	WILDCAT	BOBCAT	COUGAR	MUSTANG	BEAVER
Wing Span	39 in.	39 in.	51 in.	48 in.	44 in.
Length Overall	30¼ In.	30¼ In.	36¼ In.	36½ In.	26 In.
Wing Area	330 Sq. In.	387 Sq. In.	412.5 Sq. In.	372 Sq. In.	233.375 Sq. In.
Fap Area	55 Sq. In.		137.5 Sq. In.	84 Sq. In.	
Total Wing Area	385 Sq. In.		550 Sq. In.	456 Sq. In.	
Air Foil	HJ-03515	HJ-03515	HJ-03515	HJ-04015	HJ-10400
Finished Wt. (Approx.)	2¼ Lbs.	2 Lbs.	2¾ Lbs.	2½ Lbs.	6 Oz.
*Wing Leading	.093 Oz.	.083 Oz.	.084 Oz.	.087 Oz.	.0257 Oz.
*Wing Leading with Occupant	Engines .19 to .35	Engines .19 to .35	Engines .29 to .50	Engines .29 to .50	.0428 Oz. ½A
Class		Stunt	Super	Full Stunt	½A PAA
Type	Full Stunt	Trainer	Stunt	Scale	Load

*Per Sq. In. (Approx.)

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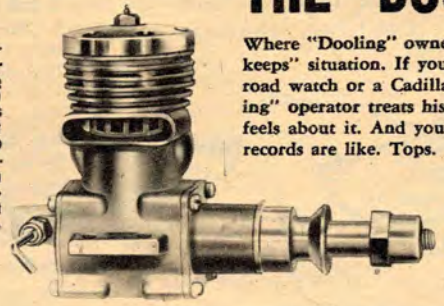
IT'S ALWAYS "BUYERS—KEEPERS" WITH

THE "DOOLING 29"

SPECS
Bore .800 — Stroke .594 — Bare weight 6½ oz. — Aluminum piston, with rings — Crankshaft mounted with two ball bearings — Molybdenum iron cylinder liners — H. P. ¾ at 17,500 R. P. M.



Where "Dooling" owners are concerned, it's a "for keeps" situation. If you've seen a man with a railroad watch or a Cadillac, you know how a "Dooling" operator treats his engine. You know how he feels about it. And you have a good idea what his records are like. Tops.

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plaints, exhibits and very positive statements that there did exist an FW 198! So here is photographic proof of the "de Schelde" aircraft, the factory in which the de Schelde S.21 (FW 198) was started, and some of the other many fine designs of this Dutch concern. For this data we are indebted to the SAAB Aircraft Company of Sweden whose SAAB-91B Safir Trainer/Tourer all-metal 3-seater is being built under license by de Schelde for the Royal Swedish Air Force.

Let us hope this closes the record on the much-publicized but entirely fictitious FW 198!

Western

(*Continued from page 57*)

the world over.

Since the F.A.I. also recognizes flying wings as well as the orthodox type of model, there are eight categories in which to fly these U-control models. It was very interesting to note at San Diego that the only Convair employee who entered the contest was one of the very few who did not fly a delta design, for which the company is so justly famous and proud.

Another point of extreme interest was the rock-stable flights of all the deltas flown in comparison to the orthodox models.

It might furthermore be noted that of every flight attempted by this type of model (and there were over fifty flights made), every flight was successful, every take-off smooth. Not a single tangle, spin or tumble; that in itself speaks well for this design.

Merl Hoyt's jet job turned in 138 plus, only 3 mph under his orthodox model, and he very firmly believes that he can up this considerably since it is his first ship of this design and he feels that he made a few mistakes when it was designed and built. We sincerely believe that the immediate future will see more and more deltas and

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1052—Cessna L-19; Perky; and Gorgeous Gertie.

952—"Shoestring" U/C; Clough's A/2 helicopter; Little Sport F/F.

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652A—Fokker Eindecker E. I World War I U/C flying scale; Bouncing Bertie, semi-scale U/C triplane.

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552—Half-A F/F scale Curtiss Racer; U/C scale Dart Kitten; Reinhardt's Galloping Comedian .29 to .35 stunt.

ATA 521—.09 Fokker Tripe U/C; B-36 solid; Ole Slippery team racer; Horton t.l. scale glider; Little Senator A/2; Bienenstein's outdoor stick.

ATA 522—.32-.60 AT-6; Bristol Bullet rubber bipe; Dunham's outdoor cabin.

ATA 523—Happy Medium record-holding Free Flight. .29 or .31 engines, 68 inch span; Executive twin #50 Jetex powered all balsa semi-scale, 18 inch wingspan; Double Whammy stagger wing U/C stunt for .29 to .35, 36".

452—Don Still's Stuka Stunt model; Thomas-Morse control line flying scale; Hall-Massey speed models.

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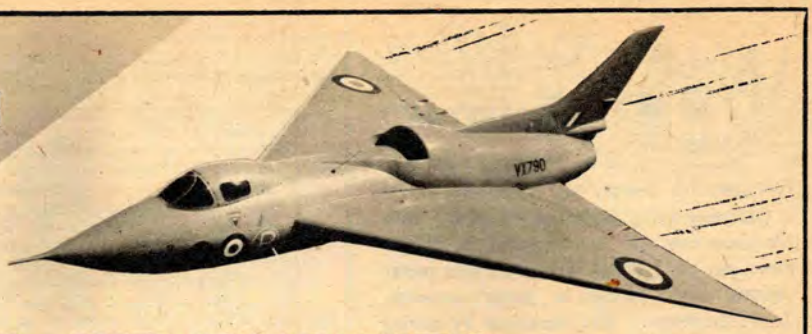

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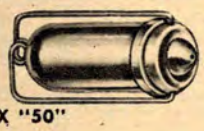

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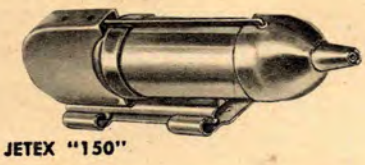

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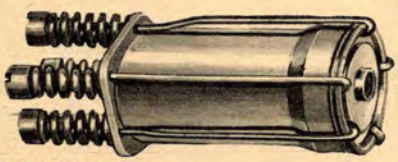

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someday expect the old separate wing and tail to become a rarity—strong words, but watch them fly. Then build one.

Some of the other details are the necessity of obtaining a sanction three months in advance of the contest date; publication of the prize list and a surety that these prizes will be awarded. As far as cost is concerned it is high in relation to our regular contests. Sanction fee is $10 because of the extra work load and necessary correspondence with F.A.I. Headquarters. Any engines which exceed the record must be impounded for calibration of displacement by the U.S. Bureau of Standards; the fee for this is $15 each. Telegrams to the A.M.A. and subsequent ones to F.A.I. immediately following the meets are necessary.

There are five forms which must be filled out in triplicate and notarized, and in our case a total of 60. California law states that a minimum of 50 cents has to be charged, so $30 more went into it. No pylon was available but one was built at a cost of only $14, due to the fact one of the local builders, Ed Rominger, has a complete machine shop and a welding torch. All in all this meet cost in the neighborhood of $100 with no prizes other than the honor of competing against records set by the world's best model builders.

The contest except for the financial side was very successful. Four fellows exceeded the established records and their flights have been presented for homologation by the F.A.I.

The most outstanding flyer by far was Merl Hoyt who flew his jet-powered models well past the established records. In orthodox type models he flew at a clip of over 141 mph or 227.86 kilometers per hour; in the flying wing class he did 222.222 kilometers per hour, only 3 mph under his orthodox model—real going. Dr. R. G. Lambert flew his Dooling .29 delta at a 165.898 kilometers per hour speed, with an engine that was really giving him trouble. For some reason or another it just wouldn't turn up, something rare for a Dooling. Harold Leddington flew a Class I flying wing

(*Continued on page 70*)

15 Fifteen Famous Fighters 15

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(Continued from page 69)

powered with an uncowled OK .099 at 90 kilometers per hour to exceed the established record in this class.

Most of the other fellows had plenty of headaches, more than their share.

San Diego's PAA meet was almost twice as large as last year's—it couldn't help but be Gardner's watches, since the directors and terrain were exactly the same. Flying was much better, due to better engines and much cleaner designs in the models. The hottest ship by far was Louis Culler's Torp-.19-powered, which really got a lot of air underneath it in 20 seconds. Jack Oxley's huge A design was the most consistent, with Dino Cocchi, a junior, turning in two perfect flights of six minutes each to easily win junior Class A.

The flights were limited to six minutes because it was thought this time was a better criterion than the ten-minute limit. It allows the fellows to retrieve more easily, for the ships do not go so far and the contest can be run off smoother and faster. Those fellows who fly from small fields could really appreciate this limit, and ties do not pop up as some might think.

Dick Sladek won his second first-place watch in three contests to place 1st in A-B open with an excellent 14 minutes plus, closely followed by Jack Oxley and Louis Culler. In Half-A Open, Ray Van De Walker was first with the same two guys following in the same order for second and third. Bob Turner and Nat Autonoli were 2nd and 3rd in A-B-Jr.-Sr., while Dave Zeller topped Half-A, with Mike Butcher 2nd. A lot of activity with ships scattered all through the canyons, but most of them were recovered.

—DICK EVERETT

Air Adventurers

(Contniued from page 36)

New York 21, N. Y., and for data on general industry progress, expansion, manufacturing figures and such, write to the Aircraft Industries Association of America, Inc., 610 Shoreham Building, Washington 5, D. C.

For highly technical data we refer you to the Institute of Aeronautical Sciences, at 2 East 64th Street, New York 21, N. Y. (same address as the Flight Safety Foundation); and for data on motorless flight, (gliding and soaring) gliders and sailplanes and launching techniques, contact the Soaring Society of America, Inc., Box 71, Elmira, N. Y.

If your problem or question deals with personal aircraft or private flying we suggest that you get in touch with the Aircraft Owners and Pilots Association, Washington Building, 15th Street and New York Avenue, N. W., Washington 5, D. C. Should your interest run to national or international records and trophies your best source is the National Aeronautic Association, 1025 Connecticut Avenue, N.W., Washington 6, D. C., and if it has to do with model aircraft records, trophies or contests, direct your letter or inquiry to the Academy of Model Aeronautics at the same address as that of the N. A. A.

Should you be an Air Force member or veteran of either the Air Force or the old Army Air Forces and are interested in keeping up with the latest developments of your branch of the service, contact the Air Force Association, 1424 K. Street, N.W., Washington 5, D. C.

Incidentally, you will note that many of these sources of information are associations or organizations. Many of them will welcome inquiries regarding membership requirements.

This is particularly true in organizations like the Civil Air Patrol auxiliary of the United States Air Force. We can not overstress the advantages of becoming a member of this veteran organization, either as a Cadet or Senior Member, and enthusiastically recommend that you inquire locally as to the nearest active Flight or Squadron of CAP. If none seem to be located near you, send in the CAP "info wanted" coupon found in each issue of Air Trails.

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aviation contact the Office of Public Information, Department of Defense, Washington 25, D. C. There are representatives of both the Air Force and the Navy's Bureau of Air attached to this section of the Department of Defense. Explain your request and it will be directed to the proper handling officer in the particular branch of the service in which you are interested. And, by the way, the Navy has some excellent three-view drawings of many of their top aircraft that are available to modelers.

If you are particularly interested in Naval aviation and/or general Navy operations, we suggest that you write to the United States Naval Institute, Annapolis, Maryland, requesting information as to membership.

Many educators and teachers are unaware that much interesting educational material for classroom work and use may be obtained for the mere asking by contacting manufacturers, airlines, and other agencies. We suggest that you call this to their attention and point out that a list of such sources has been prepared by the United States Office of Education and will be presently available from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Gorgeous Gertie

(Continued from page 40)

ounces. Without nacelle unit, towline weight was slightly over five ounces. With the addition of approximately one ounce of ballast for glide trim, the model's weight was boosted slightly over six ounces, just about what the A. M. A. rules specify for the wing area used.

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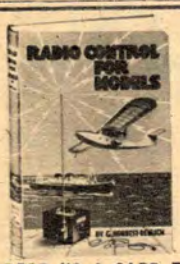

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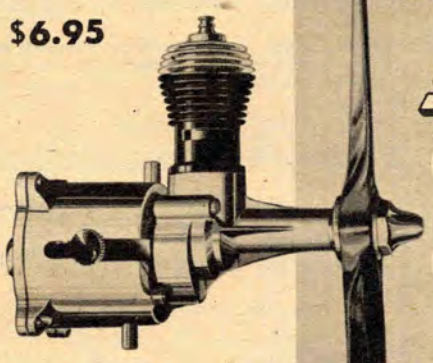

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"AT" Data Dept: THE SCORE

(Continued from previous issue)

This initial model was soon followed by others, simplified greatly by eliminating the springs and mast rubbers, and using thin wood blades attached to a stiff spar and a flexible wire mast. Models built here and in England proved the soundness of the system. Fig. A.

The articulated rotor mast was fine for autogiros, with due restrictions on the articulation to prevent clipping the prop or the tail, because it permitted the initial tilting, which starts the gyroscopic wobble, to damp out without running through a cycle of self-excitation back and forth through the mast. But, for model helicopter work a flexible mast seems impractical.

If rotation is supplied by the rotor, as in the case of the autogiro, it will run concentric and true if in balance. But, if one tries to feed power into the rotor through a flexible mast the whole thing will jump out of line and wobble violently with the whole system acting as an eccentric.

In the practical sense, then, this means that a flexible mast cannot be used on model helicopters except, possibly, where the propulsive force originates in the rotor, as for example, tip-jet propulsion.

At this point the writer became acquainted with the work done by Arthur Young, who designed the Bell helicopters, and this takes us into a discussion of the so-called "feathering rotor" system in which the blades neither cone upward nor drag back, and in which, for the first time, we begin to see inherent stability introduced into rotary wing flight.

In order to understand the differences between the fully articulated and feathering systems it is necessary to look a bit more closely at gyroscopics, the seemingly puzzling, but actually rather simple set of shenanigans which take place when a rotating system is disturbed.

Any rotating system, and this applies with particular emphasis to helicopter rotors, is a gyroscope, and jointing, hinging or springing it will not make it anything else; it will still observe the natural laws which govern gyroscopic action. This is probably the most puzzling and least understood factor in rotary wing flight, and the reader will find it of value if at this point he takes the trouble to make up a small "understanding tool" and follow along with the text.

Cut out a six-inch circle of heavy cardboard and mount it with a pin through the center in the end of a short length of ¼" stock which has its sides numbered consecutively: 1, 2, 3, 4. This represents a rotor—and a gyroscope. If you wish, mark the disk with an arrow showing left hand rotation (most model helicopter rotors will be left hand in rotation because of mechancial considerations which will develop later on).

First, flick the disk with the fingers to make it spin rapidly, then poke gently under the rim of the spinning disk on the side of the stick marked 1. What happens? The edge of the disk rises, not where you poked at it, but at 90 degrees, the side marked 4. Repeat the experiment, only this time poke it at 3. It rises at 2. What is happening? Simply this: the deflecting force is modified by a factor of 90 degrees.

This is the first rule: that a gyroscope, if deflected, reacts with a displacement proportional to the deflection at 90 degrees in the direction of rotation from the impingement of the deflecting force. (Of course it also deflects an equal amount in an opposite direction 90 degrees back from point of impingement, but we're trying to keep this thing simple.)

With the understanding tool at hand this becomes quite easy to understand, or, think of it this way: if a rotor blade is deflected at one point in its circumferential travel, it will tend to pop up 90 degrees further along in the direction of rotation.

Now, spin the disk again and gently tilt the stick. Note that while the gyroscope initially tends to remain in its original plane, it will now gradually readjust itself until it is spinning with its plane perpendicular to its axis (the stick). If the disk were mounted on a universal joint and driven by rotation of the stick this effect would be even more pronounced.

This occurs because it is a function of centrifugal force to cause the rim of the disk to recede as far as possible from the axis, and this condition is satisfied at 90 degrees.

These two related phenomena are of extreme importance to helicopter designers: first, a deflection reacts at 90 degrees; second, a gyro seeks rotation perpendicular to its axis.

Now remove the stick and take the disk outside and scale it through the air with a quick spinning motion. Note how it tips over toward the advancing side. Two factors are responsible for this behavior. The first is related to the Magnus effect and is due to differing pressure gradients on the surface of the spinning disk, and the second, which is our primary interest heli-

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ON MODEL HELICOPTERS

copter-wise, is that the air pressure at the entering edge of the disk is producing a gyroscopic resultant at 90 degrees, thus turning the disk over.

Bear in mind these vital functions as we consider the requirements of a stable helicopter rotor. One thing should be evident, that forward flight produces a problem in tip speed differentials, the advancing blade in meeting a faster relative wind than the receding blade tends to tip the machine toward the retreating blade side due to aerodynamic forces, but these aerodynamic forces are balanced to a large extent by gyroscopic forces, provided the blades do no flap upward or drag back circumference-wise and are free to rotate, within limits, about their spanwise axis.

And, if the rotor head is mounted in a gimbal, rotor deflections will not be transmitted back and forth between rotor and fuselage through the mast, which means that the helicopter will be stable. By the addition of a stabilizing flybar between mast and fuselage connected by linkages which can alter its plane of rotation, the rotor can be made to take up any position desired by the pilot.

In other words, then, if we use a flapping blade with drag links we must also include a device to alter the pitch of the blades cyclicly, mechanically; but, if we eliminate the flap hinges and drag links and allow the blades to "feather" as it rotates, cyclic pitch is automatic in accordance with the gyro-dynamics of the system.

This basic discovery about the helicopter rotor was made by Arthur D. Young of Bell helicopter fame. In this writer's opinion, based on literally scores of experiments with flying models, this discovery is one of the great aerodynamic advances of the century. Not only for the mechanism which Young worked out, which is remarkably effective, but for the principles his work outlines, which it is not extravagant to state mark the greatest single contribution to rotary wing flight.

From these principles we can arrive at a stable rotor for model helicopter work. Fig. B illustrates such a rotor. The simplicity of the thing is its beauty. With a little study of the sketch no reader will have trouble duplicating it. Note that the flybar is moved up level with the blades. This is simply a length of wire with a few turns of solder on the ends to provide operating momentum—not much weight is needed.

Note that the function of the flybar is to steer the rotor blades back into the proper position with respect to the mast through a damping interval, hence cyclic control may be had by arranging the flybar in such fashion that it can be deflected into a new plane of rotation—but, very important, the flybar must not be rigidly attached to the *mast* because this will cause rapid following; that is, the mast will tend to swing immediately the rotor is displaced, because the independent nature of the system will have been destroyed.

In Fig. C we see a system developed by the writer which uses the independent rotor principle together with control "trailers" similar to the Kaman system. The advantages of this system for model work is that it provides automatic-rotation in addition to the stability of the Young system, plus the fact that cyclic control by trailer deflection (only one trailer need be connected) is very easy to arrange with a line up through a hollow mast and out to a "loaded" trailer.

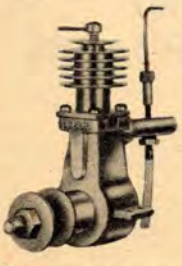
The other end of the line being attached to a cam ring which may be set to produce the cyclic deflection at any desired point. The drag of this system is higher than others and it must be designed carefully if maximum lift is to be obtained, yet its many advantages make it attractive and it is certainly capable of much greater development, particularly since it is possible, with trailers, to make use of high lift sections with less regard for pitching moments.

This system is particularly attractive for jet work, and it should be noted that by placing the line of thrust of the jet motor a bit below the center of the spanwise hinge the blade pitch will be controlled by the thrust output of the engine. However, this factor must be used judiciously because too great a moment here will result in the blade mushing around slowly at a very high pitch, which will produce no lift at all.

Remember too that trailers, in operation, should drop down into the rotor plane—don't seek to drive them either above or below the plane, since this puts them at a great mechanical disadvantage and may result in their control over blade pitch becoming ineffectual and the drag of the system very high.

Note, of course, that it is possible to use H series stable airfoils and eliminate the trailers entirely; however, if this is done the rotor system may show a tendency to tip back in forward flight, and cyclic control installation may be more difficult. But for straight hovering or vertical flight this system is unmatched for stability.

I have been asked, "How does the Jetex kit helicopter work?" This model is a good



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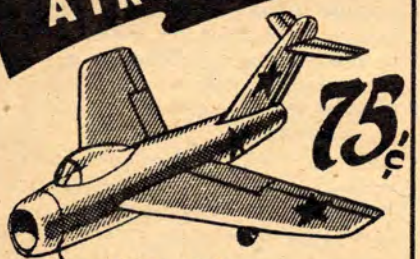

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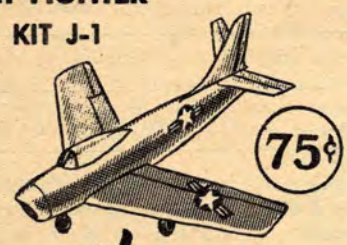

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performer with a very fair duration for this type of craft and in flight exhibits stability. If we examine the machine we can find the answer. Two blades are used which are articulated to a supporting beam. These depend, as does the Cierva system, upon centrifugal force to keep them at the proper angle in flight, without a rigid connector.

Underneath the rotor is a thrust beam to which are mounted two Jetex engines and the machine is driven by the reaction of these units.

Now, please note that the mass of the jet motors is quite high in regard to the total mass of the ship; that is, it has a sort of high-momentum flywheel beneath an articulated rotor with the mass of the pod, or fuselage being quite negligible.

Thus we see here a combination of the articulated blade system with the flybar stabilizer, which operates well if we confine activity to vertical flight. In essence this machine is dynamically similar to the writer's little Infant job of a couple years back, but being jet powered it requires no damping fins or fuselage-rotor-mast brake to retain proper heading.

However, in its present form forward flight by changing the C.G. trim will be found unreliable; the machine isn't designed for that sort of thing. It should prove a very interesting experiment to move the power beam up level with the rotor blades, and rebuild the rotor along the lines shown in Fig. B. This should produce a model capable of forward flight, as well as vertical, but the problem of auto-rotational let-down will have to be solved with some new mechanism to alter blade pitch. Also it may prove necessary to introduce a small amount of friction between the motor-flybar and its gimbal connection to the mast in order that adding weight to the nose will make it go forward and not just alter the angle of dangle of the fuselage from the rotor.

On the basis of experiment the writer suggests that configurations for first experiments be kept as simple as possible. The first helicopter should be rubber powered, something along the lines of a simple stick model, probably direct drive. It won't fly for very long with this limited power, but it can be fooled with indoors at great length and the rotor set-up ironed out. After you get the "feel" of the rotor set-up and a bit of experience in handling rotary wings, try something in gas or jet power.

The best bet for gas engines is the single rotor, or tandem rotor type—like the Piasecki jobs with a rotor at each end of a long fuselage. Co-axials, or rather composite rotor jobs, such as the writer's little Infant machine, are very simple and okay for direct vertical flight, but they won't do well in forward flight and will return to earth with quite a thump unless some free-wheeling arrangement, other than spin-in-reverse is used.

Better than free-wheeling, which will mean pitch change too, is engine two-speed control. Have a timer rigged to drop a partial obstruction into the venturi after a certain interval. This will bring the model down under power, quite gently. The really ambitious may use spark ignition in conjunction with timer control—but watch the weight. It takes *power* to fly helicopters.

It is impossible of course, in a 2-part article to cover all phases of helicopter design. However, it is quite possible and the writer hopes he has been successful in this respect, to outline some primary essentials. In answer to the question, then: "What's the score on the helicopters?" the reply is this: you can build them and fly them successfully if you understand the basic dynamics.

In this report are shown two stable rotor designs. They work, they have been flown, they do not hop and jump madly about and there is no element of luck about it; they can be duplicated by any average modeler who will take the time to understand just what forces are involved and how they react. If, in times past, the reader has tried unsuccessfully to design his own, or has purchased kits which did not perform as well as expected, he should re-examine his experience in the light of the material he has just read, make a couple more experiments and decide for himself that practical model helicopters are not only possible but downright fascinating.

In general, then, we may sum it up as follows: It is better to use a shallow pitch and run the rotor at a good clip; make the blades of high aspect ratio—and thin section. Be sure the pitch is equal on both blades; mount the torque prop as far aft as practical—it will absorb less power, and keep the design of the model as simple as possible and the bearings as near perfect as you can get them.

There are several things to watch out for. For one thing, the rotor blades should be quite stiff. Balsa wood if hard is pretty fair, but pine or even birch is better. Because of the thin sections which must be used, and the high rotor speeds, an overly flexible rotor blade may develop "whip" due to resonance. This will make the blades run out of track, absorb a terrific amount of power and may result in tearing the

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model apart, particularly if a whipping blade connects with the drive string to the torque rotor.

Some of the writer's early models used exceptionally flexible blades without articulation or feathering features, yet flew. How? By adding quite a bit of weight to the tips. Thus as the rotor was spinning up for take-off as the model sat on its wheels a gyroscopic plane or reference was established which held the model fairly steady for the brief duration of the rubber power.

This won't work well if power is continuous, as for a gas motor; the model will gradually tip over a bit to one side and then jump violently at 90 degrees. The reason for this behavior is that a sort of cycling occurs due to blade flexibility, at the first small tilt, and this condition is rapidly excited back and forth until something disastrous happens.

With single rotor and torque prop models a change of heading may be noticeable immediately after jump-off. This may be only a few degrees or a quarter circle, even if the balance of thrust is correct. The way to minimize this is to hold the model for a second or two to allow the rotors to come up to speed. For gas jobs use old friend "stooge" to hold the model down until ready.

Theoretically the axis of the torque prop should lie in the plane of rotation of the rotor. Practically it must be somewhat below this plane. This is due to fuselage effects, aerodynamically speaking, and to the mechanical consideration that we must keep the prop drive string (or shaft) well clear of the rotor tips. Empirically it works out rather well, because design considerations necessary for power location, landing gear, lateral areas, etc., work out so as to make it possible to locate the torque prop axis well down out of the way.

Assuming a left hand rotor, it will be noted that if the axis of the torque prop is too high the machine will fly sidewise to the left, and if the axis is too low it will fly to the right. Properly located, the model shows no tendency to slide off in either direction.

This is a very happy circumstance because it means that by combining a few factors, such as level of the torque prop axis with C.G. we may make a model of very simple design fly in any desired direction *without a separate cyclic control mechanism.*

This statement reads rather simply, but go back and look it over again, for it contains the essential elements of *practical* model helicopter flying in that we see now that adjustment of the model helicopter, and the mechanism to make that adjustment possible, are not a complicated mess of pushrods, cams and levers, but are in fact no more complicated than the adjustment of an ordinary free flight model of the conventional type, and in many ways simpler.

And, incidentally this is no condemnation of cyclic controls, as such, for they have much to offer the purist and the researcher. However, and analogically, the writer must point out that we do not find it necessary to build operating ailerons, rudder, elevator and flaps into a conventional free flight model in order to enjoy it tremendously.

Power transmission may scare the uninitiated at first, particularly the bevel gear drive shown in one of the pictures. It shouldn't. It does present a new problem, true, yet a simple drive of this nature is but the work of a few minutes to produce, requiring far less effort than the control system of, say, a team racer.

The gears are readily obtainable in any toy store; for 20 cents two toy egg beaters yield six gears, four small and two large ones. You can't even buy a good bellcrank for that. There are dozens of ready sources of small gears, toys, old alarm clocks, etc. Fuel line (brass) and landing gear wire takes care of the shaft and bearing problems nicely and adequately.

To drive the torque prop use balsa wood pulleys faced with #1 sandpaper and a string belt. About 2½-to 3-1 is a practical ratio and slippage with this system is nil.

Gas power requires heavy reductions in speed and some sort of shock clutch or take-up may be necessary if any considerable weight or power is to be used. We hope to cover this phase more fully at a later date and show some simple gas motor hook-ups which require no machining or difficult work.

One pitfall to avoid is the idea that a large, high pitch, slow moving rotor will produce longer and better flights. It won't. Power requirements will be tremendous, which means a thicker motor will be required, meaning more weight, meaning it can't be wound as many turns, meaning a great deal more power will be needed for torque correction—a vicious circle that adds up fast.

Rotor blades should be of fairly high density, thin in section and operated fairly fast at low angles of attack. For the present, helical pitch should be shelved in the interests of simplicity; use flat blades of uniform pitch until you build up a little experience at helicopter flying.

The sketches show general proportions and sound design practice. Stick pretty closely to these layouts, at least for your first machine, then strike out on your own.

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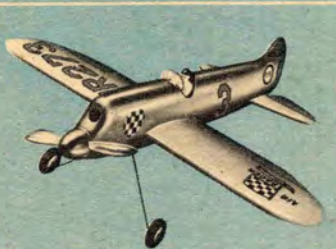

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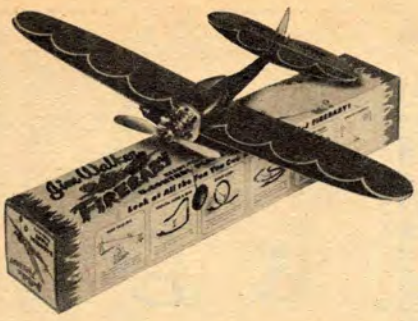

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Dope Can

(*Continued from page 52*)

sible for his eventual success—his parents, his fellow hobby club members and his hobby dealer.

Sounds good, doesn't it? Let's schedule it for an early showing. Maybe we can use it to drum up some interest on the part of the city fathers in our need for a model flying field!

M-5 Parts Found! From tiny Cubs to the big 5-cylinder Burgess (née Morton) M-5 engine we go. In answer to a lot of requests that have come in regarding parts for this machinist's marvel, we tracked down the M-S Engineering Co., Box 192, Libertyville, Ill. Says Edward M. Sawusch of M-SEC: "We took over the interests of the M-5 engine from Burgess several years ago. We were in limited production until last year when the materials situation made it economically impossible for us to continue producing engines. We do expect to resume production but cannot make any forecasts at this time."

Now here's the good news for you M-5 fans: "We are, however, continuing to service M-5 engines and to supply replacement parts. We shall be happy to supply an accessory parts list to M-5 owners requesting same."

So for heaven's sake, stop writing "AT" and start writing M-S, mates.

Got Some Clubs. In San Bernardino, Calif., the Aer-O-Nuts Pres. is Merle Stephens, treasurer is Clint Matthews. Secretary is Al Bronder who can be reached at 149 S. Eureka Ave. In Aberdeen, Wash., operate the Aberdeen Eagles Aeronauts—seems like an extra "s" there someplace; guess the "Eagles" is the fraternal organization, in which case we'll refer to the club as the Eagles' Aeronauts. Anyhoo, John Haines is president, Bill Darkow is secretary. Club has 15 members. You can reach John at Box 364.

The Balsa Termites MA of Lakeland, Fla. (sorry, no street address given—*tsk!*) really do their elections up brown. Looka the titles: Douglas Gaines, pres.; Kit Logan, veep; Bob Milton, sec.; Howard DeVore, treas.; Curtis Logan, sgt. at arms; Harry Herring, trailer custodian (!); George Gaines, leader member (of AMA, we assume); and John Forshew, field judge. We see in the voting that apparently Douglas "gains" over George, but who has a Curtis kit? Certainly not Bob, hez gone fishing for herring. Okay, okay, put down that club—we'll stop, pop.

Wanza Write. Yessir, these folks are just eager to put pen to paper, fingers to typewriter keys, brush to parchment and correspond. Ed Lidgard of the '52 U.S. Wakefield team tells us Colin E. Cliff, Bona Vista, Warrague, Victoria, Australia, is looking for a genuine correspondent and habitual balsa bender like himself—maybe also an ex-service pilot. Colin is 31, married, has 2 small daughters, main interest

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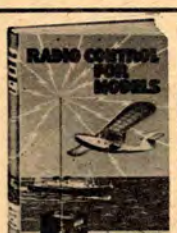

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Walter Coate, M/Sgt., that is, RA6901679, 7690 Hq Vienna Military Post, APO 777, c/o Postmaster, NY, has glow plug McCoy "38" and can't get fuel over there. Will swap for ignition engine from .29 to .60. Any takers?

Thirteen, enthusiastic over Half-A control line and solids is Norman Hubbard, RR #3, Columbus, Kan. All his neighbors are interested only in hunting and fishing—he can't get anybody to talk models with him. For goodness sake, somebody send him a letter and cheer him up.

Hez got gp engines, wants diesels: Tom Nickel, 815 Rosewood Ave., Winnetka, Ill. Now if he was only a rubber model man we could describe him as the "big wind (rhymes with time) from you know where."

New phase of the hobby, apparently—swapping used "AT" plans. Howard L. Wulf, RR 2, Lost Nation, Iowa, has some he'd like to unload in exchange for different drawings.

André Charest of Toronto has the answer to Jack Wolfe's query which appeared a few issues back: where can one get plans for the F4U-1 Corsair? At Polk's in NYC, says André; that outfit has a 40-inch free flight plan that can be converted easily to U/C.

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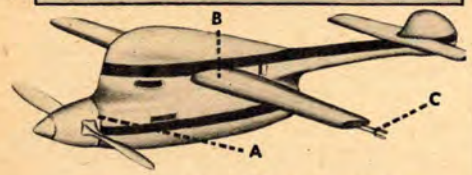

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—DOPESTER

Basic Airfoils

(*Continued from page 38*)

between glide and power setting. How are we going to dissipate these differences?

The way the model actually does it is to develop looping characteristics. The loop need not be an exact loop but it could be converted into a helix or banked circle. Somehow the model has to make curved motion so that the "circular airflow" will reduce the angle of attack.

When all is said and done you will find that a model using a thin airfoil wing will climb smoothly and in a gradual curve, while the model using thick or undercambered airfoil will always have a spiral type of climb and may even display looping characteristics. It is this simplicity of power flying that has made the thin airfoil popular. And not because of its alleged lower drag due to its "thin" thickness. Always remember, that at the same speed, the lift developed causes the same amount of drag no matter what type of airfoil is used. (Check the airfoil characteristic chart and compare the C/L values—better not to quote examples of thick airfoils giving "no-helix" climbs . . . it can be done, but that gets us into fine details.)

It is difficult to recommend particular airfoils for particular designs. The facts given above are your best guide. If you have trouble flying high-powered models, and are using an undercambered or thick airfoil, a shift to a thinner section will make power flying much easier. But if you know

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While every precaution is taken to insure accuracy we cannot guarantee against the possibility of an occasional change or omission in the preparation of this October 1952 index.

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how to control undercamber, then you can count on much better duration from your glide portion of the flight.

The Göttingen 574 and Rhode St. Genese 26 were included to show that pointed leading edges and thick trailing edges do not make much, if any, difference in the airfoil characteristic. If your construction requirements call for such edges, do not hesitate to use them.

The NACA OOXX series were included for the consideration of control stunt model fans. It would be interesting to see if the behavior of the "full-scale" airfoils as shown by characteristic charts actually does occur in model practice. Here is what they predict: for small stunt models the NACA 0012 is "better" than the NACA 0018. The thicker section will make the model sluggish in looping or "corner" maneuvers. The model will tend to slow up and seemingly lose lift. This fact is predicted by the sharp "stalling point" of the thicker section at low Reynolds Number (a small wing at slow speed). As a matter of fact, the thick section did not come into full-size plane use until the speed was increased by addition of more power.

On large and high-speed stunt models the NACA 0018 is much better than the 0012. This is especially evident in tight looping. The thicker section will make a much tighter loop. This fact is shown on the charts. The NACA 0012 will stall at 8 deg., while the NACA 0018 will stall at 12 deg. This means, if you have the power to overcome the drag at this angle, the wing will be able to generate more lift with which to counteract the centrifugal force developed in a tighter loop. (If the model's weight is two pounds, and it is flying in a 20 ft. diameter loop at 50 mph, the centrifugal force will be 34; the wing will have to generate 34 pounds of lift.)

As you can see, we can still have fun trying to discover the best airfoil for a particular model. However, do not forget that the airfoil is but one item in the picture. The most efficient airfoil is useless if used on a mediocre or haphazardous design. Only if every other part of the model is perfectly matched to other parts will a perfect airfoil give its perfect performance.

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PHOTOS of aircraft from Wright biplane to latest jet. 250,000 photos in stock. Also old aviation books. Send dollar bill for six real photographs of the latest jets, plus the NEW 1952 catalogue. Aeroplane Photo Supply, Box 195-A, Toronto, Canada.

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CURTISS P40F GAS MODEL

48" Span. Free flight or U Control

Improved with new 2¾" alum. spinner and 3" Veco alum. disk semi-pneumatic rubber wheels. Planked type body, parts printed on balsa, and all parts. Set **$9.00**

REPUBLIC P47D GAS MODEL

35¾" span, ⅞" scale. Length 30½". One-piece moulded, clear plexiglas cockpit enclosure. 2½" scale alum. disk rubber wheels. Body planking full size plans. Uses B or C motor. Set **$5.95**

9' TAYLOR CRAFT GAS MODEL

9 foot Span. Can use Radio control. Set has 36 ready cut wing ribs, cut plywood body formers, 16" carved prop, tail wheel unit, 2 full size plans, printed balsa, silkspan, etc. Uses "C" type motor, single, twin, or 4 cyl. motor. Set without motor or wheels, postpaid..... **$17.50**
Extra pair of 4½" airwheels, $3.00

VOUGHT F2G GAS MODEL

41" span. U Control B or C Motor. Scale model of 1949 Thompson Trophy winner. Set has 2½" scale rubber tired alum. disk wheels 4¼" aluminum cowl, body planking, moulded, clear plexiglas cockpit enclosure, plastic spinner, etc. This is one of the finest equipped models in the world. Const. set **$6.75**

Fokker D-8 Gas

39" span. 1½" scale. Const. set **$5.95**

Stearman PT17

Set has 2½" celluloid motor, plastic prop, etc. 23" span. Const. set **$2.95**

Curtiss F11C4

32" span. 1" scale. Const. set. Rubber driven.. **$4.50**

Grumman-F3F1

32" span. 1" scale. Const. set. Rubber driven... **$3.75**

N. American B-25

33½" span. ½" scale. Const. set. Rubber driven... **$4.00**

Elf 1-3 h.p. 4¾" wide. Price **$49.50**

WATCH FOR
4 New Scale GAS MODELS
coming soon!

1 Twin Motor Bomber
1 "B" Type Racer
2 ½A Scale

All top flight beauties

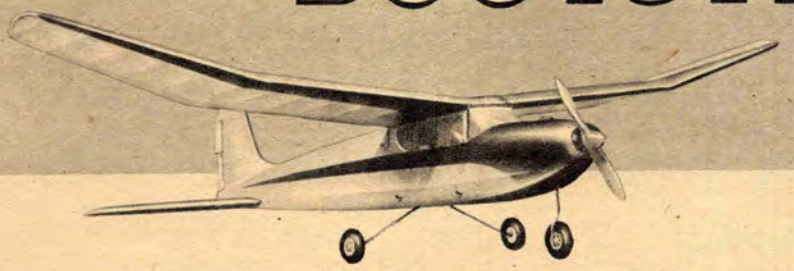
Add 25c for postage. Catalog—10c coin

MINIATURE AIRCRAFT CORP.
83 Low Terrace, Staten Island 1, N. Y.

For Radio Control . . .

Free-Flight . . . PAA-Load!

Berkeley's BOOTSTRAPS "A-RC"



52' NATIONALS BULLETIN:
BERKELEY DESIGNS WIN MORE PLACES THAN ALL OTHER COMMERCIAL DESIGNS COMBINED! PIPER SUPER CRUISER WINS SCALE "1/2 A" OPEN ... INTERSTATE CADET WINS JUNIOR AND SENIOR...

BOOTSTRAPS "A-RC"

54" Wingspan — 36 oz. Total Weight- (with batteries and radio unit)

For Engines .09 to .14 Displacement

$3.95

Kit Features:

- Complete Pre-fabricated and Die-Cut Wood!
- Die-Cut Windshield!
- Covering Material!
- Formed Landing Gear and Complete Hardware!

- Removable Radio Unit!
- Tri-cycle Gear!
- Split Rudder for Trim and Radio Control!

Designed by Henry Struck, former National Champion and designer of dozens of championship models. This is his latest and best . . . the result of many years of consistent test and improvement. The tri-cycle landing gear gives easy ground handling. The split rudder allows ease of adjustment for all flight conditions. The radio unit can be removed, complete with batteries for easy bench testing and checking.

RADIO & PAA-Load Designs . . .

$4.95

Pre-fabricated Kit — **$1.95**

"SUPER BRIGADIER"

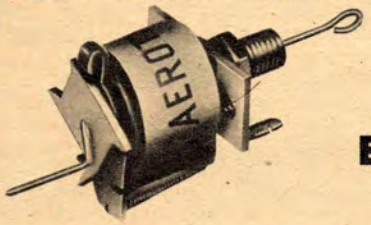
58" Wingspan—For .19 to .36 Engines

Especially designed by Henry Struck for Radio Control and PAA-Load flying. Plans show details for installation of equipment. Pre-fabricated.

BRIGADIER "R. C.-38"

For .035 to .099 Engines—38" Wingspan

This completely re-designed "½ A—A" Free-Flight may be flown as a Radio Control job, a PAA-Load model, or a free-flight Sport Flyer. Plans include Radio Control and PAA-Load installation details. The kit is pre-fabricated with formed gear, die-cut balsa and plywood parts, hardware and notched trailing edges.



Super Aerotrol

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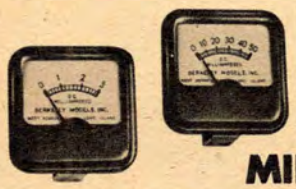
$3.95

Entirely new and different! Rugged yet compact. Single hole mount. Draws 2 to 5 times less current. Operated by rubber power, it will deliver at least twice the control operating force of other escapements without "skipping." Completely self-neutralizing, it returns the control to neutral after the signal stops.



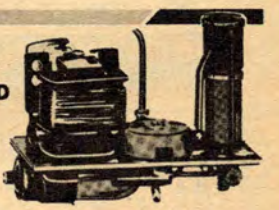
Super Aerotrol

MILLIAMETER

Low in cost, manufactured specifically for use with Super Aerotrol equipment. O-3 Milliameter for use with Super Aerotrol Receiver. O-50 Milliameter for use with Super Aerotrol Transmitter.

O- 3 Milliameter **$3.50**
O-50 Milliameter **2.75**

27 m.c. CRYSTAL-CONTROLLED RADIO CONTROL



"SUPER AEROTROL"

NO OPERATORS LICENSE REQUIRED!

First Transmitter You Can *Build, Operate, Maintain* Yourself!

DUST-CORE TUNED Super Aerotrol RECEIVER

- Operates on either 27.2 or 52 mc.
- NEW super-sensitive relay.
- NEW "locked-channel" dust-core tuning. (We have shipped the sample receivers across the country and to Europe without the frequency changing!
- Light in Weight, 2¾ oz. less batteries.
- Simple super-regenerator circuit, 100% dependable.

Kit includes: Finished, tested sensitive relay; finished dust-core tuner; drilled bakelite base with condensers and eyelets attached; all electrical components, condensers, resistors, coils, chokes and potentiometer; all necessary contacts, and color-coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included.

Kit— **$13.95**

Crystal-Controlled **Super Aerotrol TRANSMITTER**

- Completely portable — Self contained — No separate antenna — No external Batteries! • Operates on 27.255 mc. • Weighs 3.5 lbs.

Kit includes all necessary parts (except tube and batteries): Precision Ground Crystal; Painted Metal Cabinet; Finished Sectional Antenna; stamped and formed chassis with all holes punched; all necessary components, resistors, condensers, coils and chokes; color coded wiring. Can be assembled in less than two hours. Complete building and operating instructions are included —

Kit— **$21.95**

DE-Aerotrol (for 52 mc.) Complete Kit— **$22.95**

Includes Transmitter, Receiver, Escapement (less batteries and tubes).

1CFG-1	Receiver Tube	$3.50
3A5	Transmitter Tube	3.50

*Prices and specifications subject to change.

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Berkeley's 1952 CATALOG . . . 25¢

THE WEN-MAC .049

RETAILS FOR $6.95 COMPLETE

A POWERPLANT UNEXCELLED
IN PERFORMANCE.....try it!
DESIGNED AND PRECISION BUILT
TO EXACTING STANDARDS.....see it!

DELIVERS POSITIVE POWER
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VASTLY SUPERIOR CONTESTWISE,
SPORTWISE, AND PLEASUREWISE....buy it!

With a WEN-MAC .049
ENJOY THE REAL THRILL OF THE WILD BLUE YONDER
get up, out and ahead with the most powerful, most wonderful ½A powerplant in the world
AT YOUR FAVORITE HOBBY DEALERS SHOP NOW!

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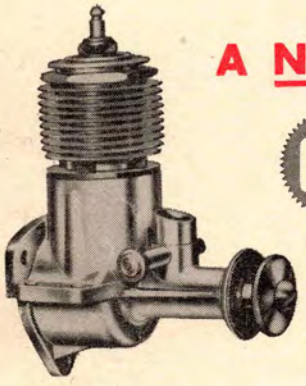
For PRICE, POWER, and PERFORMANCE

15TH ANNIVERSARY OK 1937 ★ 1952

A Complete Line of PROVEN Miniature Engines and Accessories



A NEW DISPLACEMENT!

OK CUB .14

Produced at the request of top plane designers! Opens an entirely new field for the hobbyist. A light-weight engine with the extra power so often needed. For free flight, control line and radio controlled flying.

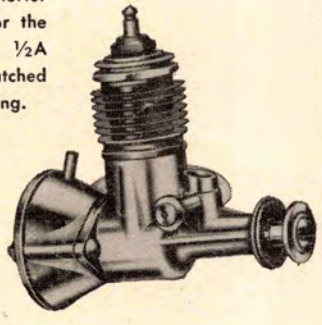
CLASS A

Displ. ..... .149	RPM ..... 3,000 to 15,000
Bore ..... .600	Weight ..... 2¾ oz.
Stroke ..... .530	Price ..... only **$8.95**

A NEW CUB FOR THE EXPERT!

OK CUB .049X Combination Package

Companion to the famous .049 Cub. Provides higher output due to shorter stroke, larger bore, lighter weight. Designed for the advanced hobbyist. The top performer in the ½A Class. Package includes assembled engine, matched prop, extra rear cover, fuel tank, neoprene tubing.

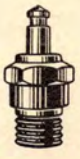


CLASS ½A

Displ. ..... .049	
Bore ..... .420	
Stroke ..... .360	
RPM .. 3,000 to 15,000	
Price .. only **$6.25** Complete	

SEE YOUR DEALER . . . Or write us direct

O. K. GLOW FUEL
Pint 85¢



O. K. PLUGS
Short or long — 59¢

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POWER KIT
"Assemble-it-Yourself"
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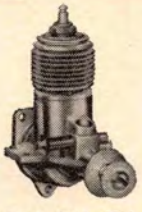

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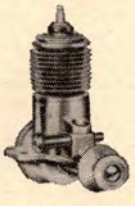
$5.95



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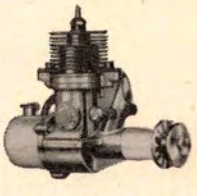

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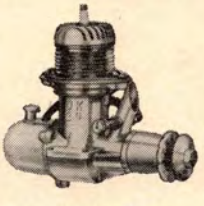

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